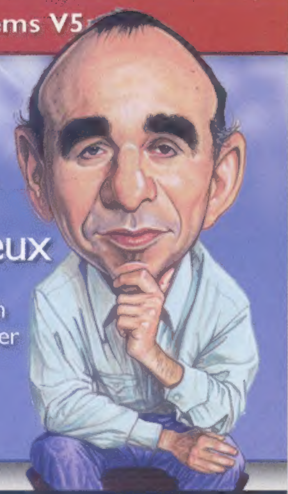
Preview: GeForce FX 5950 (NV38) & 5700 (NV36) Ultra ■ **Review:** Nimble Microsystems V5

CPU®
COMPUTER POWER USER



Peter Molyneux

Gabbing With This Developer Is All Fun & Games

(page 108)

*Linux Distros

On Bootable CDs

(page 99)

* The Tools To Make A Mean Mod

(page 90)

* Massive Memory Roundup

(page 19)

* Searching For Swappers:

How The RIAA Watches You

(page 47)

Regular Columnists

- Anand Lal Shimpi
- Alex "Sharky" Ross
- Kyle Bennett
- Chris Pirillo
- Pete Loshin
- Lisa Lopuck
- Rob "CmdrTaco" Malda
- Joan Wood
- Mike Magee
- Alex St. John

Hardware Reviews

- Intel Pentium 4 Extreme Edition 3.2GHz
- ATI Radeon 9800 XT
- ABIT IC7-MAX3
- Shuttle SB65G2 XPC

HARDWARE HOLIDAY GIFT GUIDE

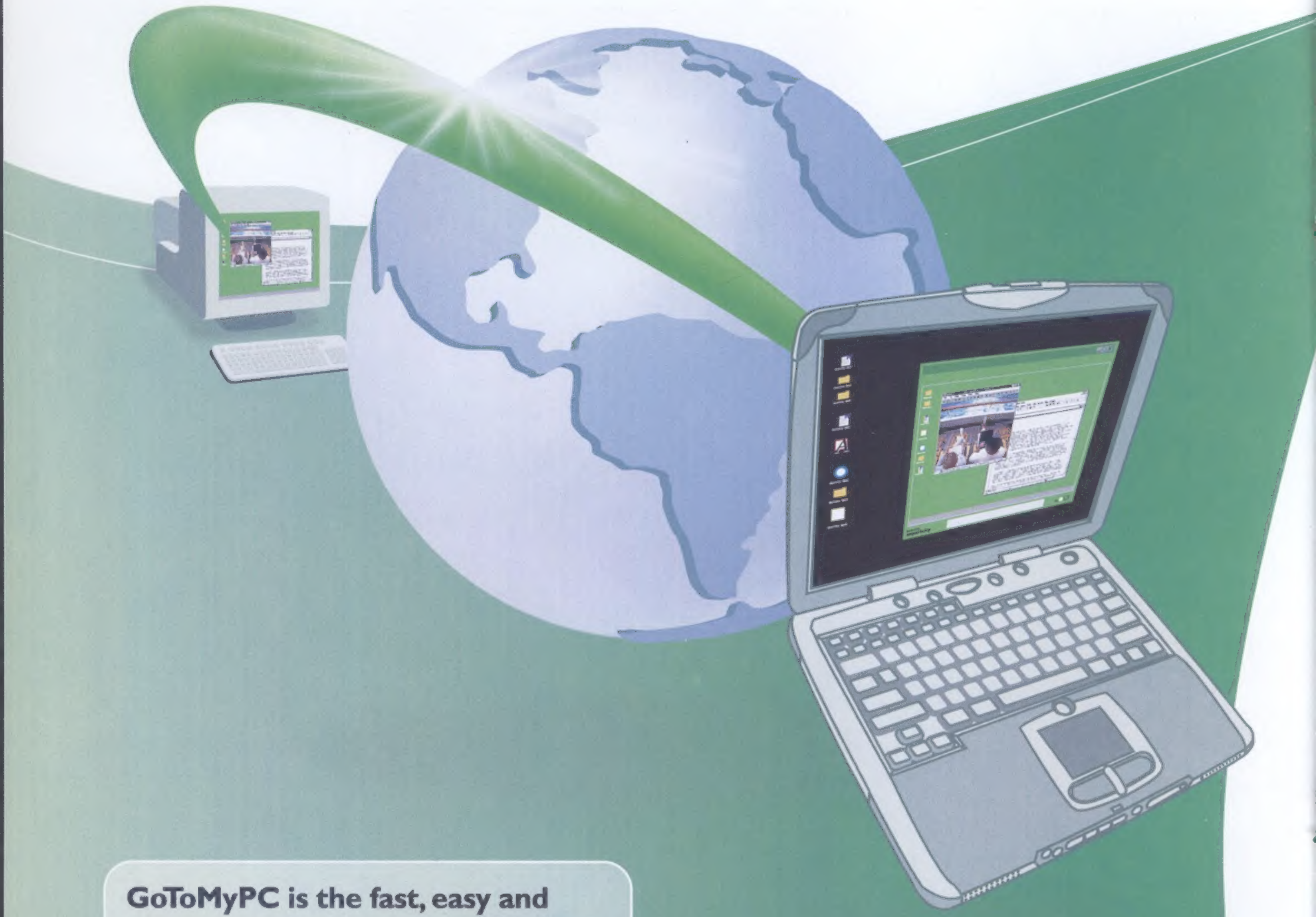
Ultimate Gifts For Geeks

December 2003 • Vol. 3 Iss. 12
$5.99 U.S. $7.99 Canada

12>
0 74470 81182 4

GoToMyPC™

Like being there.



GoToMyPC is the fast, easy and secure way to access your PC from any Web browser in real time.

Fast and instantaneous access to all your emails, files, applications and network resources.

Easy to install (2-minute, one-time setup), manage and work from anywhere.

Secure and powerful end-to-end AES 128-bit encryption to protect all remote connections.

Access Your PC from Anywhere

Why GoToMyPC Web-Based Remote Access?

GoToMyPC provides you with all the capabilities of standard remote access plus the convenience of accessing your PC from any Internet-connected computer or wireless device. Unlike with other remote-access solutions, you install GoToMyPC just once on the PC you want to access – no additional software is required. GoToMyPC is the fastest, easiest and most secure solution for accessing your PC from anywhere.

PC WORLD WORLD CLASS 2003

"The remote-access star is GoToMyPC."
PC World, July, 2003

For your free 30-day trial, visit:
gotomypc.com/smart
or call (888) 666-3310. (You must type in the full URL to receive this offer.)

GoToMyPC™ also offers enterprise solutions for remote access. As a managed service, GoToMyPC Corporate™ can lower costs, instantly Web enable applications and fully control end-user security settings. GoToMyPC Corporate delivers the security, reliability and scalability today's enterprises require. For a complimentary evaluation of GoToMyPC Corporate, call (888) 666-1680.

GoToMyPC and the GoToMyPC logo are registered trademarks of Expertcity, Inc. © 2003 Expertcity, Inc. All rights reserved.

CPU
COMPUTER POWER USER

December 2003 • Vol 3 Issue 12

Frontside

6 What's Happening
12 Digital Economy
17 **The Saint**
My Time In China

The Experts

Kyle Bennett
[H]ard Talk
page 37

Alex "Sharky" Ross
The Shark Tank
page 36

Joan Wood
Forward Slash
page 80

Alex St. John
The Saint
page 17

Rob "CmdrTaco" Malda
The Department Of Stuff
page 79

Lisa Lopuck
Site Scene
page 78

Anand Lal Shimpi
Anand's Corner
page 35

Chris Pirillo
Dialogue Box
page 67

Mike Magee
Shavings From The Rumour Mill
page 102

Pete Loshin
Open Sauce
page 68

ULTIMATE

HOLIDAY HARDWARE GIFT GUIDE

Spotlight

50 **Components That Keep On Giving**
An Ultimate Holiday Computer Shopping Guide

60 **Your Essential Software Shopping List**
Apps & Utilities For Enhancing Your PC

Copyright 2003 by Sandhills Publishing Company. *Computer Power User* is a trademark of Sandhills Publishing Company. All rights reserved. Reproduction of material appearing in *Computer Power User* is strictly prohibited without written permission. Printed in the U.S.A. GST # 123482788RT0001 (ISSN 1536-7568) *CPU Computer Power User* USPS 020-801 is published monthly for $29 per year by Sandhills Publishing Company, 131 West Grand Drive, P.O. Box 82667, Lincoln, NE 68501. Subscriber Services: (800) 424-7900. Periodicals postage paid at Lincoln, NE. POSTMASTER: Send address changes to *Computer Power User*, P.O. Box 82667, Lincoln, NE 68501.

Did you find the hidden CPU logo on our cover? Turn the page for the answer.

Heavy Gear

18 **Dream Hardware**
These Gizmos Don't Sing It, They Bring It

19 **Mighty Memory**
Our High-Performance Roundup

24 Intel Pentium 4 Extreme Edition 3.2GHz
AMD Athlon 64 3200+

25 ATI Radeon 9800 XT

26 NVIDIA GeForce FX 5950 Ultra (NV38) & GeForce FX 5700 Ultra (NV36)

27 DFI 865PE INFINITY Mobo
ABIT IC7-MAX3 Mobo

28 Biostar iDEQ 200P
Nimble Microsystems V5

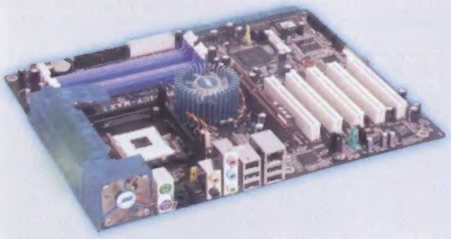
29 Microsoft Wireless Optical Desktop Elite
HP iPAQ Pocket PC h4350

30 FIC ICE-Cube IC-VL67 vs. Shuttle SB65G2

35 **Anand's Corner**
And The Winner Is… The Radeon 9700 Pro?

36 **The Shark Tank**
Requiem For A Cheat Part 2

37 **[H]ard Talk**
The Smoke Clears



Hard Hat Area

38 **Optimizing For Hardware In DirectX 9 Titles**
Who's Zooming Who?

41 **Swappin' Parts**
CINDI's Frosty Farewell

44 **X-ray Vision: FogScreen**
Now You See It, Now You Walk Through It

47 **White Paper: The RIAA's Watchful Eye**
How The Recording Industry Tracks You

Loading Zone

63 **The Bleeding Edge Of Software**
Inside The World Of Betas

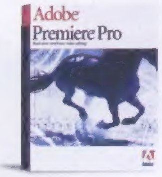
64 **Up To Speed**
Upgrades That'll Keep You Humming Along

65 **Adobe Premiere Pro**
One Hard-To-Beat Video Editor

66 **muvee Technologies autoProducer 3.0**
Home Movies On The Quick

67 **Dialogue Box**
Lookout 2003

68 **Open Sauce**
Free Software & Freedom



Caught In The Web

70 **Fringe**

72 **All Singing, All Dancing**
Eyeblaster's Ads Of The Future

76 **Coder's Corner: XML**
XSLT, Part 12: The Muenchian Method

78 **Site Scene**
Multimedia Goes Online

79 **The Department Of Stuff**
hohoho.txt

80 **Forward Slash**
Ch-ch-ch-ch-changes!

Digital Living

82 **Road Warrior**
New Palms Pop, 3G Dutch Headaches, Cingular Wireless Has It's Own Headaches & More From The Mobile Front

WEB **Pick A Peck Of Helpful Apps**
Top Software For Your Palm, Part 2

84 **At Your Leisure**
Plug In, Sit Back & Fire Away

Tips, Tricks & Mods

90 **Modding Tips & Tutorials**
Feel The Power
Antec TrueControl 550 vs. Vantec Stealth VAN-520A
Tools Of The Trade
What Every Good Modder Needs

96 **Software Tips & Projects**
Tell A Bigger Photo Story

99 **Warm Up To Penguins**
Distributions On Bootable CDs

What's Cooking

102 **Shavings From The Rumour Mill**
Intel Piggybacks Over AMD's Hot Dogs

103 **Technically Speaking**
An Interview With Don Woods, The Man Who Introduced Adventure

106 **Under Development**
A Peek At What's Brewing In The Laboratory

Back Door

108 Q&A With Peter Molyneux

Infinite Loops

Strange stats and other oddball items from computing's periphery

70, 98, 89, 99

GREETINGS FROM SAMITLAND

Hi folks, welcome to the beginning of our third year here at *Computer Power User.* We've come a long way since those "early days," and I wanted to send out a few thankyous. Thanks for sticking with us and supporting us, for the feedback you've given us and for being there for us. Oh, and thanks for putting meals on our tables. Hehehe—that's important this time of the year. Anyway, as I noted last month, you'll be seeing some changes in next month's issue (mostly based on the feedback you've been sending us). And lest I forget later, please send your tech questions to us at Q&A@cpumag.com. Answers are forthcoming.

Like last year, we sat down and took a good, hard look at the best hardware you'd need to build a dream machine and then set upon our task to build the best. You'll find our selection of hardware starting on page 50. We tried to appeal to both the AMD and Intel lovers amongst you in making our selections. Don't forget to tear out the handy shopping list on page 58. Now, what's all this fab hardware without software to run on it? To that end we've put together a nice compilation of software throughout the issue.

Let's take a look at a few of this month's highlights: There's a memory roundup on page 19, an in-depth look at DirectX 9 shaders on page 38, and a very witty "Back Door" interview on page 108 that features a lot of bonus content online. (Nonsubscribers can use the free 30-day issue code [CPU849]; instructions on the insert between pages 102 and 103.) There's a lot more, but I need to actually worry about putting this issue to bed, so I'm off. And sorry, there's just no time to sing "Happy Birthday" to *CPU* this year, but hey—check out the top of page 4 in our December 2002 issue for some song and dance. I'll catch up with you one last time before Christmas. Did I mention to my friends, readers, and <coff> wife how much I love electronics? Happy shopping!

Samit G. Choudhuri, Publication Editor, *CPU*

Sandhills Publishing

Web Services
(For questions about our Web site.)
webhelp@cpumag.com
(800) 368-8304

Customer Service
customer-service@cpumag.com
Computer Power User
P.O. Box 82667
Lincoln, NE 68501-2667

Hours
Mon. - Fri.: 8 a.m. to 8 p.m. (CST)
Sat.: 8 a.m. to 4 p.m. (CST)

To Place An Order Or Change An Address
(800) 733-3809
FAX: (402) 479-2193

Subscription Renewals
(800) 382-4552
FAX: (402) 479-2193
http://www.cpumag.com

Authorization For Reprints
(800) 334-7458
FAX: (402) 479-2104

Editorial Staff
editor@cpumag.com
FAX: (402) 479-2104
131 W. Grand Drive
Lincoln, NE 68521

Advertising Staff
(800) 848-1478
120 W. Harvest Dr.
Lincoln, NE 68521
FAX: (402) 479-2193

The Gang

Editorial Staff: Ronald D. Kobler / Samit Gupta Choudhuri / Jennie Schlueter / Blaine Flamig / Corey Russman / Rod Scher / Christopher Trumble / Calvin Clinchard / Kimberly Fitzke / Katie Dolan / Raejean Brooks / Rebecca Christensen / Tara Weber / Sally Marek / Michael Sweet / Katie Crooks / Shawn Kupfer / Dana Montey / Nate Hoppe / Sheila Allen / Heather Svoboda / Jennifer Hansen / Marty Sems / Chad Denton / Nathan Chandler / Kylee Dickey / Josh Gulick / Trista Kunce **Web Staff:** Cindy Pieper / Mary Lafferty / Dorene Krausnick / Missy Fletcher / Nick Ray **Customer Service:** Travis Brock / Alisha Lamb / Brandie Humphrey / Becky Rezabek / Lana Matic **Subscription Renewals:** Liz Kohout / Connie Beatty / Matt Bolling / Patrick Kean / Charmaine Vondra / Miden Ebert / Kathy DeCoito / Stephanie Contreras / Nicole Buckendahl **Art & Design:** Lesa Call / Fred Schneider / Carrie Benes / Ginger Riley / Sonja Warner / Leigh Trompke / Lori Garris / Jason Codr / Andria Schultz / Erin Rodriguez / Lindsay Anker / Aaron Weston **Newsstand:** Mark Peery / Garth Lienemann / Kelly Richardson / Chris McGreer / Marcy Gunn / Jeff Schnittker **Advertising Sales:** Grant Ossenkop

PRINTED WITH SOY INK

Gotcha. Here it is.

GRAPHICS BY ATi

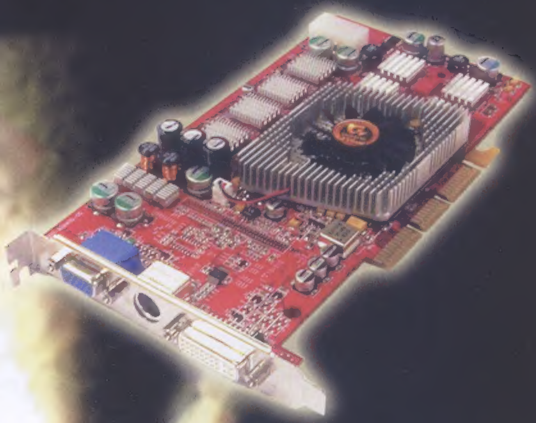
GIGABYTE™ TECHNOLOGY

POWERED BY ATi RADEON 9800 PRO

RADEON 9800 PRO

GV-R98P256D 256 MB DDR

GV-R98P128D 128 MB DDR



- Powered by ATi RADEON™ 9800 PRO Visual Processing Unit (VPU)
- 256MB/128MB DDR memory accelerates the latest 3D games
- Supports the new AGP 8X standar
- Supports the latest Microsfot DirectX® 9.X and OpenGL® 2.0 feature sets
- 8 parallel rendering pipelines process up to 3 Gpixels/sec
- Brand New 256-bit memory interface
- DVI-I and TV-Out connector supported
- Supports Gigabyte V-Tuner for overclocking and hardware monitor

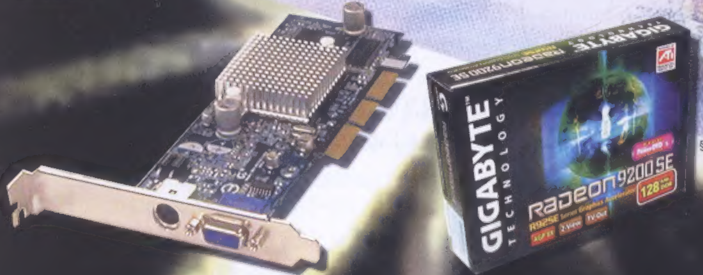
POWERED BY ATi RADEON 9600

RADEON 9600

- Powered by the RadeonTM 9600 Visual Processing unit (VPN)
- Fully supports DirectX 9.0
- Supports the new AGP 8X standard
- 4-pixel pipeline architecture
- All new 64-bit memory interface
- 128 MB DDR memory accelerates the the latest 3D games
- First to use pixel shaders to accelerate video
- Supports DVI-I and TV-Out connectors

POWERED BY ATi RADEON 9200 SE

RADEON 9200SE



- Powered by the RADEON™ 9200SE GPU
- 128MB DDR memory for advanced 3D graphics
- 200MHz engine and 332MHz DDR memory clock speeds
- Supports the new AGP 8x standard
- HYPER Z™ II technology integrate
- SMARTSHADER™ and SMOOTHVISION™ eliminates distracting visual artifacts for smoother looking images without seriously compromising performance

* Purchase of Video cards include the following:

- Power DVD 5

- Raven Shield (Full Version!)

- Tomb Raider (Full Version!) Angel of Darkness

- Will Rock (Full Version!)

*Bundled games may vary with different cards purchased

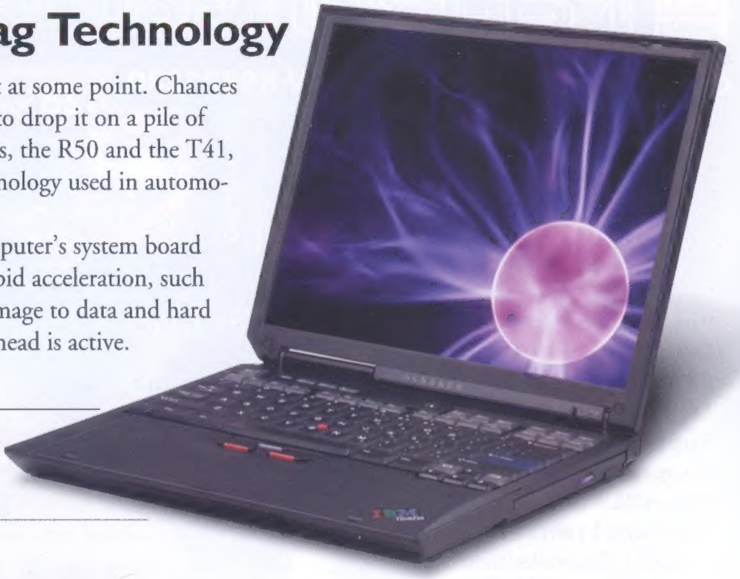
Available Through: *For other regional distributors, please contact G.B.T. Inc*

Tech Data www.techdata.com
WINTEC INDUSTRIES www.wintecind.com
D&H www.dandh.com
ASI www.asipartner.com
Fry's Outpost.com www.outpost.com
MA*LABS ONE-STOP PC COMPONENT SUPPLIER www.malabs.com
LEADER TECH www.leadertech-chicago.com
BASS COMPUTERS, INC. Hooked on Customer Satisfaction! www.basscomputers.com
SYNNEX www.synnex.com
SED INTERNATIONAL www.sedonline.com
LEADMAN ELECTRONICS www.leadman.com

Upgrade Your Life™ www.giga-byte.com

Compiled by
Kyle Schurman

New ThinkPad Borrows Airbag Technology



If you own a notebook computer, you've probably dropped it at some point. Chances are, the results weren't good (unless you were lucky enough to drop it on a pile of really fluffy pillows). Two new IBM ThinkPad notebook models, the R50 and the T41, hope to prevent data loss from such mishaps by employing technology used in automobile airbags.

IBM's Active Protection System uses a microchip on the computer's system board to monitor the movement of the system. If the chip detects a rapid acceleration, such as from a fall, it stops the hard drive's read/write head. Most damage to data and hard drives occurs when a computer is dropped while the read/write head is active. Prices for the new notebooks start at $1,500. ▲

IBM's newest ThinkPad models can protect the hard drive from damage from a fall.

Quantum Tape Drive Takes Quantum Leap

Quantum's SDLT 600 tape drive can transfer data at 72MBps.

The latest tape drive from Quantum promises data capacities and transfer speeds double what was available with its previous drives. The company hopes the drive will give its DLT (Digital Linear Tape) standard a boost in the battles over tape drive standards.

Quantum's new tape drive, the SDLT 600, can transfer data at 72MBps and can store up to 600GB of compressed data because of new compression techniques. Most customers use today's large-capacity tape drives to back up corporate data. Quantum has also made the SDLT 600 easier to use and troubleshoot than previous drives, as it looks for an edge in the tape drive market. Other tape drive standards include LTO (Linear Tape Open), backed by HP and IBM, and AIT (Advanced Intelligent Tape), backed by Sony and others. ▲

PCI Express, InfiniBand Debut In Sandia Cluster

Those hoping the PCI Express and InfiniBand open interconnect standards will be major successes will be eyeing the demonstration of a 128-node HPC (High Performance Computing) cluster at Sandia National Laboratories. Sandia will evaluate the low-latency capabilities of the standards and determine the benefit of the standards to HPC clusters.

The Intel-based HPC cluster, recently delivered to Sandia, will run PCI Express Ethernet and Graphics adapters on servers from Linux Networx and Celestica. The cluster uses a combination of Intel Xeon and Itanium 2 processors and will run the Linux operating system.

The HPC cluster is one of the world's top-performing systems. After the testing and evaluation phases for the HPC cluster are completed, Sandia plans to use the cluster for internal research and development. ▲

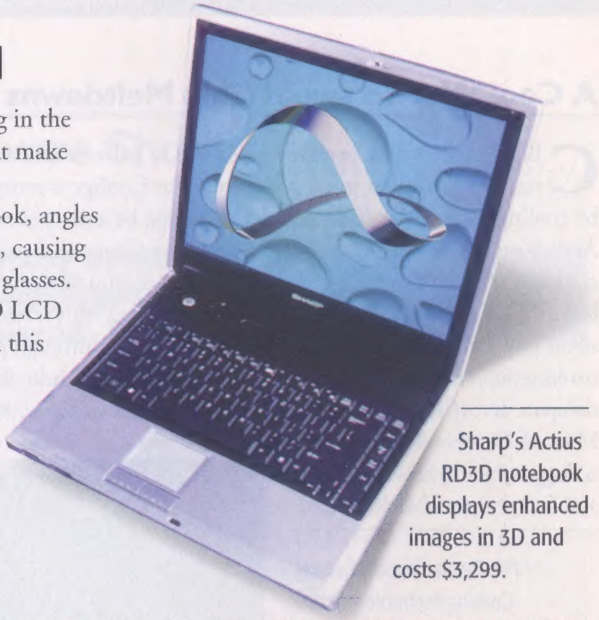
Sandia Labs will test the PCI Express and InfiniBand standards with its newest HPC cluster.

3D Notebook, No Glasses Required

Sharp Systems of America is bringing 3D viewing to notebook computing in the United States, but don't invest your retirement money in companies that make those geeky 3D glasses.

Sharp's TFT 3D LCD technology, appearing in the Actius RD3D notebook, angles the light coming from the notebook screen toward either the left or right eye, causing the brain to create a sense of depth in the image without the need for special glasses. The Actius RD3D notebook is the first U.S. product to employ the TFT 3D LCD technology. (We reported on the Japanese version, the Mebius PC-RD3D in this section of last month's *CPU.*)

The Actius RD3D ($3,299 street price) can display 3D images in applications that have been enhanced for 3D. It also can switch back to 2D mode whenever needed. It offers a 15-inch LCD screen, a Pentium 4 2.8GHz processor, 512MB of DDR SDRAM, and a 60GB hard drive. ▲



Sharp's Actius RD3D notebook displays enhanced images in 3D and costs $3,299.

Hardware Mole

Chip Package Rescues Memory-Gobbling Cell Phones

Americans aren't yet watching television or holding videoconferences on their cell phones, but when they're ready to, Intel will have a new memory chip package waiting. Intel expects the memory chip package, called the StrataFlash Wireless Memory System, to be especially popular first in Asia, where running video on cell phones is a growing trend. The chip package squeezes as much as 1Gb of total memory (either flash memory or RAM) in four stacked chips in the phone, doubling the current top capacity of two stacked chips. Memory demands for cell phones are doubling every 15 months, according to industry experts. ▲

Intel's new memory chip package gives cell phones as much as 1Gb in total memory.

PSX To Take Entertainment To New Level

Sony recently announced plans to begin selling its next-generation, high-end PlayStation, called PSX, in Japan. The PSX, which is similar in size to PS2, will sell in Japan for the equivalent of $700 to $750. Sony expects to offer PSX in the United States sometime in 2004, but the company didn't speculate on a suggested retail price. PSX is far more than a gaming console, offering a 160GB or 250GB hard drive, a TV tuner, a DVD burner, and USB and Ethernet ports as it attempts to become the entertainment hub for your home. One thing is for certain: This isn't your teenager's PlayStation. ▲

The Axim X3i handheld is the first from Dell to offer Wi-Fi capabilities.

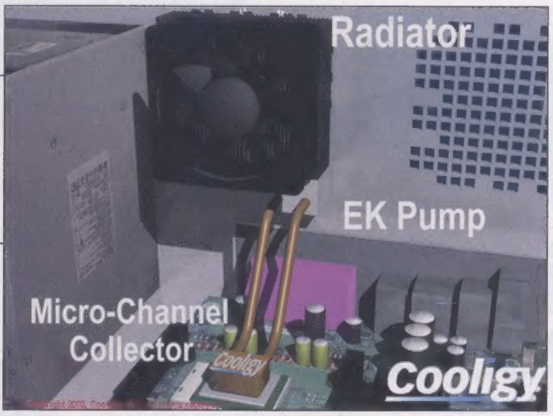
Dell Handhelds Join Wireless Crowd

Dell recently continued its push into the consumer-electronics market, introducing its first Wi-Fi handheld, the Axim X3i ($379). Analysts say the Axim X3i will be the first of several Dell handhelds to offer wireless networking capabilities. The Axim X3i has a 400MHz Intel processor, 64MB of memory, and a 3.5-inch color screen. A version without wireless capabilities is available for $329. Analysts say Dell currently is the fourth-leading manufacturer of handhelds, trailing Palm, HP, and Sony, but is gaining market share. ▲

Compiled by Dean Takahashi

A Cool Way To Avoid Chip Meltdowns

Chip designers have been forced to rein in performance in order to reduce heat dissipation for the fastest microprocessors. But Cooligy is trying to attack the heat problem by cooling down chips with techniques that go beyond the traditional heatsink or fan. Andy Keane, vice president of marketing, says Cooligy's founders have figured out a way to cool microprocessors by placing another chip on top of them. This chip has tiny tubes no bigger than the width of a hair, each of them filled with water. Key to the technology is a silent pump that uses an electric field to drive water through porous glass disks. This "electro-kinetic," solid-state pump pushes the water so that heat absorbed through the metal can dissipate across a wide range of tubes within a heat radiator. Keane says the new Active Micro-Channel Cooling technology, which is more efficient and less prone to breakdowns than cooling systems with mechanical pumps, can dissipate hundreds of watts. The product should hit the market by the end of 2004. ▲



The Active Micro-Channel Cooling technology from Cooligy offers a new twist on fluid-cooling systems for chips.

Intel & Xerox Team Up To Create Digital Imaging Chips

When Xerox needed to improve the quality of its copiers without incurring big costs, the copier maker turned to Intel to jointly develop new imaging chips. Three years later, the two companies announced two new chips, the MXP5800 and MXP5400, that combine the best features of digital signal processors and custom chips. Larry Lewis, a researcher at Xerox, says the chips have two tiers of processing capability. The chips have eight image signal processors that can be configured for connections with each other in a variety of ways, depending on the application. According to Lewis, each processor itself is a multiprocessor that can carry out 40 to 60 tasks simultaneously. The result, says Lewis, will be copiers that can produce color copies at the rate of 12 pages per minute for every chip they use. He says the chips, available by the end of this year, will be used in high-end copiers, scanners, and printers. ▲

Intrinsity Ups The Ante For High-Performance MIPS Chips

MIPS licensee Intrinsity has created a 2.5GHz version of its FastMATH Adaptive Signal Processor. The signal-processing chip is designed for use in applications such as communications, in particular cellular base stations capable of processing broadband data signals, or storage processors. The FastMATH's coprocessor employing 16 engines can do the work equivalent of 400 processors running at 100MHz. Yet it only dissipates eight watts, a relatively low amount for a chip running at such a high frequency. Max Baron, an analyst at InStat/MDR, says the chip is far more efficient than desktop microprocessors considering its high clock rate and power dissipation that is a fifth of a typical computer microprocessor. Intrinsity already has chips available at 1.5GHz and 2GHz speeds. The chip is expected to be in production in the third quarter of 2004. ▲

intrinsity
the Faster processor company™

Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

Released	Original Price	Current Price (10/14/03)	Last Month's Price
AMD Athlon XP 2000+			
1/7/2002	$339	$56	$59
AMD Athlon XP 2100+			
3/13/2002	$420	$59	$60
AMD Athlon XP 2200+			
6/10/2002	$241	$60	$59
AMD Athlon XP 2400+			
8/21/2002	$193**	$68	$73
AMD Athlon XP 2500+			
4/22/2003	$124**	$79	$80
AMD Athlon XP 2600+			
8/21/2002	$297**	$87	$99
AMD Athlon XP 2700+ 333MHz FSB			
11/14/2002	$349**	$113	$123
AMD Athlon XP 2800+ 333MHz FSB			
11/14/2002	$397**	$134	$170
AMD Athlon XP 3000+ 333MHz FSB			
2/10/2003	$634*	$217	$256
AMD Athlon XP 3000+ 400MHz FSB			
5/26/2003	$280*	$262*	$268*
AMD Athlon XP 3200+ 400MHz FSB			
5/26/2003	$464**	$432	$442
Intel Pentium 4 2GHz 400MHz FSB			
8/27/2001	$562	$149	$161
Intel Pentium 4 2.26GHz 533MHz FSB			
5/6/2002	$423	$163*	$168*
Intel Pentium 4 2.4GHz 400MHz FSB			
4/2/2002	$562	$156	$157
Intel Pentium 4 2.4GHz 533MHz FSB			
5/6/2002	$562	$155	$156
Intel Pentium 4 2.4GHz 800MHz FSB			
5/21/2003	$180*	$169*	$168*
Intel Pentium 4 2.5GHz 400MHz FSB			
8/26/2002	$243**	$190	$204*
Intel Pentium 4 2.53GHz 533MHz FSB			
5/6/2002	$637	$190	$189
Intel Pentium 4 2.6GHz 400MHz FSB			
8/26/2002	$401**	$206*	$203*
Intel Pentium 4 2.6GHz 800MHz FSB			
5/21/2003	$228*	$204*	$207*
Intel Pentium 4 2.66GHz 533MHz FSB			
8/26/2002	$401**	$188*	$188*
Intel Pentium 4 2.8GHz 533MHz FSB			
8/26/2002	$508**	$256	$259
Intel Pentium 4 2.8GHz 800MHz FSB			
5/21/2003	$278*	$262*	$278**
Intel Pentium 4 3.06GHz 533MHz FSB			
11/14/2002	$658*	$200	$371
Intel Pentium 4 3GHz 800MHz FSB			
4/21/2003	$417**	$384*	$387*
Intel Pentium 4 3.2GHz 800MHz FSB			
6/23/2003	$637**	$431	$619*

* Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com.

SHIFT Key Does In CD Copy Protection

About two weeks after releasing its first copy-protected CD, the BMG record company saw its technology thwarted. John Halderman, a Princeton graduate student who has researched copy-protection techniques, announced that defeating BMG's copy protection on a Windows PC was as easy as holding down the SHIFT key while the computer reads the CD.

On the CD in question ("Comin' From Where I'm From" by Anthony Hamilton), BMG used MediaMax CD3 technology from SunnComm Technologies as its copy-protection technology. The companies involved say the copy protection used was designed to make copying the CD a difficult—but not impossible—process. Halderman then took the difficulty out of it in about 15 days. SunnComm considered suing Halderman soon after his announcement but then decided against it. ▲

Longhorn's Debut? 2006 & Counting

For those who've been waiting breathlessly for Microsoft's release of Longhorn, the company's next scheduled major upgrade to the Windows operating system, you may want to resume the intake of air. During a recent conference, Microsoft executives indicated Longhorn won't be ready for use until 2006. Most of the speculation in the industry expected a 2005 release of Longhorn or possibly even late in 2004.

During the conference, Microsoft executives also announced that the new data storage system that's at the heart of Longhorn—WinFS—will work with the existing Windows file system, NTFS. Early speculation over Longhorn indicated WinFS would replace or wouldn't be compatible with NTFS. ▲

Software Shorts

Here are a few software tidbits we found just before press time.

Wireless Security Still Singing The Blues

Bluetooth recently became the latest short-range wireless technology to come under fire for a lack of security. A report from @Stake, a digital security firm, says wireless devices using Bluetooth are easy to detect, making them likely targets for crackers looking to steal personal data. Bluetooth is a wireless standard often used with notebook computers and cell phones, and it supports transmissions of up to 100 meters in the 2.4GHz wireless band.

In recent months, experts have found similar security holes in other wireless standards, such as the Wi-Fi wireless networking standard, which could let attackers infiltrate a network through a wireless connection. ▲

XForms To Xtend eBusiness

Microsoft. Adobe. IBM. Sun Microsystems. When tech company heavyweights are involved in a market segment, you know it's a big market segment. And the experts agree with the big companies: The market for electronic forms holds plenty of promise for automating the exchange of corporate data.

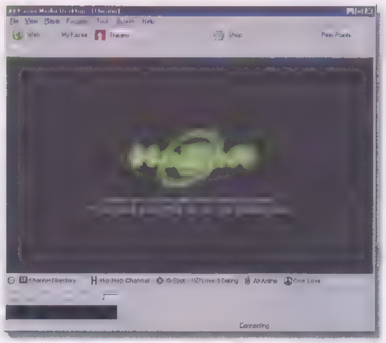
The W3C (World Wide Web Consortium) recently released the final specification for XForms 1.0, which is an implementation of XML. XForms, backed as an open approach to electronic forms by IBM and Sun, will compete against Microsoft's InfoPath and Adobe's enhanced PDF to seize control of the electronic forms market. ▲

Gaming Companies Look To Hook Software Pirates

A recent report in *New Scientist* magazine says gaming and software developers are hoping a new strategy will thwart those making illegal copies of copyrighted materials.

The report says an American company, Macrovision, and a British company, Codemasters, are developing a protection system called Fade. Fade lets software users make a copy of a CD or DVD, but the copy slowly degrades. This process gives the person using the pirated version the chance to try the software for a little while, with the hope that the person will get hooked on the game or software and then purchase it after the pirated copy degrades. ▲

P2P Plan Would Add Third P: Pay

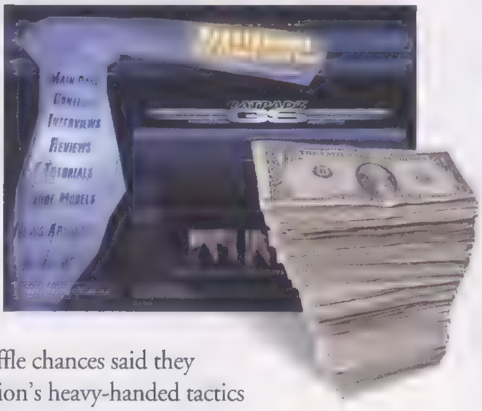


Large music companies know online music downloads are popular, both at fee-based sites, such as Apple's iTunes, and through file-swapping sites, where such downloads often violate copyright laws. However, the music companies aren't quite sure how to turn the popularity of online music into profits for their companies.

P2P providers—yes, those same providers that provide the tools enabling users to swap copyrighted music files—think they have the answer: Use the built-in customer base the P2P providers already have to phase in a pay-per-download plan.

A group of P2P providers, including the highly popular Kazaa and Morpheus, has created a business plan to implement the idea. The group says the music companies could save the time and expense of trying to build their own networks. However, the music companies are wary of trusting the same P2P providers they've been battling in court for years. The music companies turned down a similar proposal from the original Napster a few years ago before that infamous P2P provider shut down. ▲

Grass Roots Effort Covers Girl's Fine



On page 10 of the November *CPU*, we reported on the peer-to-peer community's quick willingness to pay the $2,000 fine a 12-year-old New York City girl received from the RIAA over the swapping of copyrighted music files. After that article went to press, we learned more details of the parties involved.

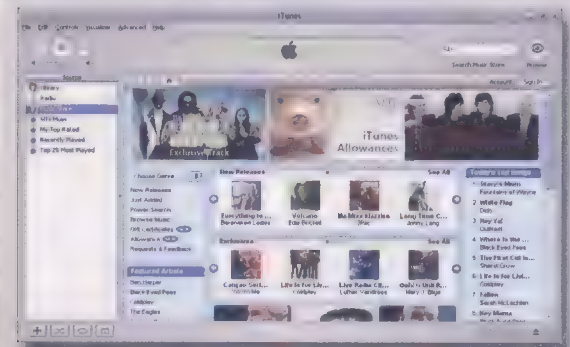
The Hypothermia Web site (www.hypothermia.us) held a raffle of a donated high-end computing system, and around 400 people donated money. Amazingly, the raffle raised the entire $2,000 in about five hours. Many who bought raffle chances said they did so to show the RIAA they oppose the association's heavy-handed tactics in suing individual file swappers. ▲

UK Web Users Turning Off TV

A recent survey involving residents of the United Kingdom shows Web usage has surpassed TV viewing on average among people who have both mediums available. It's believed to be the first major survey showing Web usage overtaking TV viewing.

In the survey, taken by NOP World, participants say they use the Internet 3.5 hours per day and watch television 2.8 hours per day, on average. NOP reported that 44% of the survey participants would rather use the Internet for news and entertainment than television.

Experts say the survey's results are surprising because the Web is a young medium compared to television. They also say TV companies will need to change to meet the changing tastes of viewers, perhaps by offering even more cross-platform content between television and the Web. ▲



The Apple iTunes for Windows software will work with WinXP or Win2000.

iTunes Comes To Windows

Mac users will have to make room for Windows users in Apple's iTunes Music Store (www.apple.com/music/store). Apple recently launched a Windows version of its iTunes software, adding it to the successful Mac version of iTunes, which Apple launched in April. Less than six months after the Mac launch, Apple claimed it had sold 10 million songs through the iTunes site, and less than a week into the launch of the Windows iTunes, the site had already reached 1 million sales. The iTunes Music Store, which is accessible directly through the iTunes software, offers more than 200,000 songs for download at 99 cents each. Visitors can also purchase entire albums for download. The iTunes service provides people a method for downloading music without violating copyright laws. ▲

Watchdog Web Site To Mimic P2P Sites

Plans are in the works for a Web site, the GIA (Government Information Awareness), that will give visitors the chance to post information about the activities of government organizations and officials. Because of concerns about legal action over the possibility of untrue or slanderous postings, the Computing Culture Group from the MIT Media Lab, which is running the project, plans to distribute the GIA's data at sites throughout the Internet using P2P networking technology. Law experts are split as to whether the site's plan to use P2P technology actually will protect the site from legal action. However, most experts say the plan will give the site's operators the best chance of minimizing their risk. For more information on the project, visit opengov.media.mit.edu. ▲

Slimmed-Down AOL To Shed $13.95

According to recent reports, AOL is considering offering a low-cost dial-up Internet service early in 2004. The service, which may be called Netscape, will cost only $9.95 per month, nearly $14 less than AOL's current monthly dial-up cost of $23.90. The Netscape service will be basic, offering one email account and some basic search and news features. Netscape won't offer the proprietary features and content that AOL offers. By launching Netscape, AOL would be attempting to stem the tide of users it's losing to discount dial-up Internet providers, such as Juno and NetZero. ▲

New On The 'Net

Looking for some new surfing destinations? Here's a sampler of the many sites that recently hit the Web.

Napster's Rebirth: Same Songs, New Fees

Napster, one of the most famous brand names in the brief history of the Web, has made a comeback. The new Napster (www.napster.com), now a division of Roxio, still offers music files for download, but it's no longer a P2P site. The music files are no longer free, either; you'll pay 99 cents per song. Napster's P2P service sparked the popularity of MP3 and file swapping, but lawsuits over copyright infringements from the RIAA closed down the original site a couple of years ago. ▲

Tough Trivial Pursuit Questions Move To Web

If you've ever celebrated being asked to name the Seven Dwarfs, then you're a perfect candidate to visit the new online home of the Trivial Pursuit game (www.trivialpursuit.com). If you're truly a Trivial Pursuit junkie, you can subscribe to the site for $29.95 per year to gain access to all of the site's features, including online tournaments with prizes and multiplayer games. Nonsubscribing guests have limited access to the games at the site. ▲

Shopping.com Says It All

Although it's almost impossible to "shop 'til you drop" on the Web, the new Shopping.com site (www.shopping.com) makes it at least possible to "shop 'til you have eye strain." Shopping.com, formerly DealTime, recently launched itself as a comparison-shopping service. After comparing products and reading customer reviews, you can also use Shopping.com to make a purchase from one of the 3,000 stores affiliated with the site. ▲

BIOS Upgrades Available Online

Compiled by Kevin Savetz

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpudec03/bios to see our entire upgrade list.

Motherboard	File (Date Available)	URL
AOpen AX4SG-UL and AX4SG-UN	R1.02 (10/10/2003)	download.aopen.com.tw/downloads/default.asp
AOpen AK77-600 Max	R1.02 (10/9/2003)	download.aopen.com.tw/downloads/default.asp
GIGABYTE GA-K8VT800M	F2 (9/25/2003)	tw.giga-byte.com/Motherboard/Support/BIOS/BIOS_GA-K8VT800M.htm
Intel D845GLVA	P08 (10/6/2003)	www.intel.com/design/motherbd/va/va_bios.htm
MSI KT4AV(MS-6712)	5.1 (10/8/2003)	www.msicomputer.com/support/bios_result.asp
Tyan Thunder K7X Pro	1.07 (10/10/2003)	www.tyan.com/support/html/b_s2469.html

Compiled by Steve Smith

CLASSIFIED

THE Job SEARCH

Mission Engineer

Remember the little computer game that Matthew Broderick hacked into in "WarGames," nearly incinerating the earth as we know it? Want to make this apocalyptic computer sim smarter? Colorado IT consultancy Productive Data Commercial Systems is looking to place a high-level Mission Engineer into the defense industry. Of course, you will need top secret clearance for starters, but then the serious play begins. You will deliver all manner of computerized wargames to various clients within the defense sector. A working knowledge of all the major operating systems is presumed, and you will be expected to be able to enter and test simulation data. Oh, and while you are getting that highest-level security clearance and total facility with computer modeling and simulation, don't forget to bone up on your missile defense architecture and principles and operational tactics. You'll need those, too, General Geek. ▲

RAW DATA

89%
The percentage of college students who say they don't always pay for downloaded commercial software
Ipsos/Business Software Association

92%
The percentage of video games purchased by adults over the age of 16
[illegible]

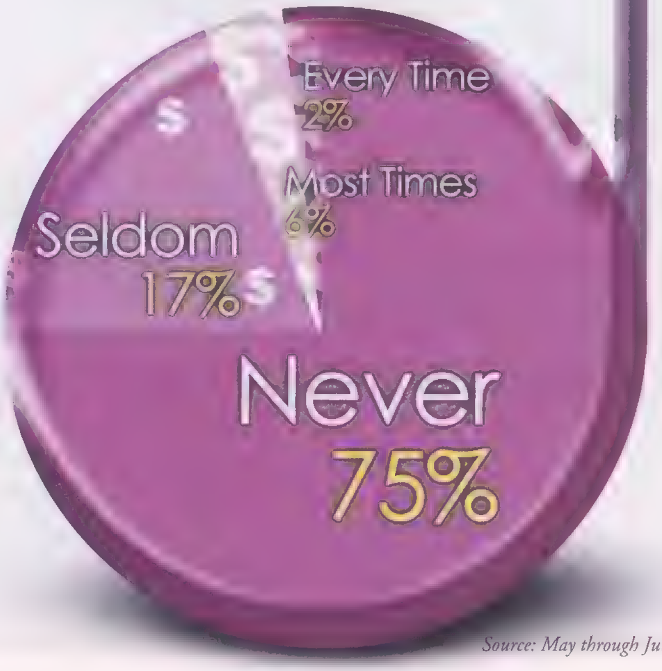
64%
The percentage of wired U.S. households with at least one digital music file on their hard drives
NPD Group

71%
The percentage of 13-to-17-year-old males who have played at least one version of Grand Theft Auto
Gallup Poll

P2P Makes A Dent

No wonder the RIAA is suing the butts off of hundreds of everyday MP3 downloaders. Music execs have seen the latest financial projections from numerous market researchers, and none of these numbers add up to future profits for a post-disc world. The move from high-profit (or overpriced) CDs is afoot, says Informa Media Group, which predicts that by 2008, 11.9% of music revenues, or $3.9 billion, will come from online payments and subscriptions. The problem is that industry losses from pirate downloading across peer-to-peer file-sharing networks will represent an even greater sales loss of $4.7 billion. The reason is clear: 69% of college students say they download music from the Web, but only 2% make a practice of paying for it, according to Ipsos Public Affairs. (See the chart below.)

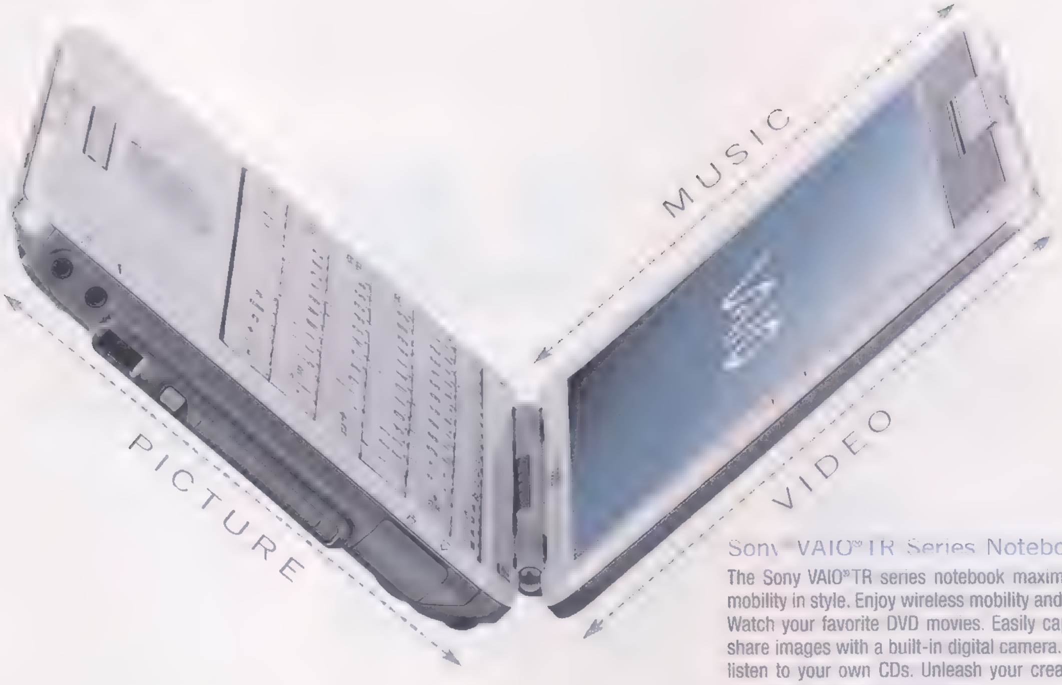
How Often Do U.S. College Students Pay For Music Downloads?



Source: May through June 2003, Ipsos Public Affairs

SONY

Sony recommends Microsoft® Windows®
XP Professional for Mobile Computing.



Sony® VAIO® TR Series Notebook

The Sony VAIO® TR series notebook maximizes your mobility in style. Enjoy wireless mobility and freedom. Watch your favorite DVD movies. Easily capture and share images with a built-in digital camera. Burn and listen to your own CDs. Unleash your creativity and experience endless possibilities.

The only PC made like a Sony is a Sony.

For years Sony has been defining and redefining mobile entertainment. For music. For video. And for computing. Around the world, Sony is synonymous with innovation and quality. Now we've raised the bar again with our new line of Sony VAIO® desktop and notebook PCs, peripherals and other accessories. All designed and built with the same Sony quality you've come to expect. Call today and our trained specialists can help you create the system that's just right for you—we'll even help with financing. Sony VAIO® TR Series Notebook with Intel® Centrino™ mobile technology.

CNET Editor's Choice Award
Sony VAIO® PCG-TR1A Notebook
–August 2003

intel centrino MOBILE TECHNOLOGY

CALL 1-877-572-SONY [7669]
VISIT www.sonystyle.com/cpu

Call or visit us online to discover a universe of entertainment, inspiration and innovation–only from Sony.

SONY

SONY VAIO® NOTEBOOKS

A style all your own.

You're unique. Shouldn't your PC reflect your individuality, as well as your interests? **Sony VAIO® Notebook PCs with Intel® Processors** have wireless capability and interconnectivity wrapped in sleek new designs that proclaim your independence. And, we can help you build your very own to your exact needs and specifications. So whether your passion is music, pictures, spreadsheets, video games or graphics, you can combine your own style with the substance that's Sony.

Z1 Series

[illegible]

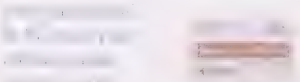
- Featuring Intel® Centrino™ mobile technology
  - Intel® Pentium® M Processor 1.60GHz[1]
  - Integrated Wireless LAN: Intel® PRO/Wireless Network Connection 802.11b[16]
  - Intel® 855 Chipset
- Microsoft® Windows® XP Home Edition
- 60GB Hard Drive[2]
- 14" SXGA+ TFT display
- 512MB DDR SDRAM
- Integrated CD-RW/DVD Combo Drive[4]
- Amazing battery life up to 6.5 hours[9]
- Integrated Bluetooth™ Wireless Technology[10]
- USB 2.0
- Stylish and sophisticated design in a 4.7lb.-light[5] and 0.9–1.5"-thin body
- Included software: PictureGear Studio,™ SonicStage,™ DVgate Plus™
- 1-Year Limited Warranty[3]

$100

~~$2,299~~
$2,199

After $100 mail-in rebate[14]
As low as $55 per month for qualified customers.

UPGRADES
- Sony VAIO® Port Replicator for $199.99
- Sony VAIO® Double-Capacity Lithium Ion Battery[9] for $499.99



Memory Stick PRO Duo™ Media

Offering MagicGate™ copyright protection, high-capacity storage and a maximum data transfer capability of up to 20MB per second, this 256MB[16] Memory Stick PRO Duo™ media is ideal for mobile applications (convenient adapter included).

MSX-M256A Memory Stick PRO Duo™ Media[11]

$124.99

V505 Series

[illegible]

- Featuring Intel® Centrino™ mobile technology
  - Intel® Pentium® M Processor 1.40GHz[1]
  - Integrated Wireless LAN: Intel® PRO/Wireless Network Connection 802.11b[16]
  - Intel® 855 Chipset
- Microsoft® Windows® XP Home Edition
- 40GB Hard Drive[2]
- 12.1" XGA TFT display
- 256MB RAM
- Integrated CD-RW/DVD Combo Drive[4]
- VAIO Creation Suite Standard software package
- 1-Year Limited Warranty

$1,799.99 As low as $45 per month for qualified customers.

UPGRADES
- Upgrade to a 60GB Hard Drive for $50
- Double-Capacity Battery[9] for $200

GRT Series

[illegible]

PGC-GRT240G
- Intel® Pentium® 4 Processor 2.66GHz[1]
- Microsoft® Windows® XP Home Edition
- 60GB Hard Drive[2]
- 15.0" XGA (1024x768) with XBRITE™ technology
- 512MB RAM
- DVD±RW/CD-RW drive[4]
- Record and watch your favorite TV programs with Sony's Giga Pocket® Personal Video Recorder
- 1-Year Limited Warranty[3]

$2,099.99 As low as $53 per month for qualified customers.

UPGRADES
- Sony VAIO® Port Replicator for $199.99
- Extra Battery[9] for $249.99

TR Series

[illegible]

PCG-TR2A
- Intel® Centrino™ mobile technology
  - Intel® Pentium® M Processor 1.0GHz
  - Integrated Wireless LAN: Intel® PRO/Wireless Network Connection 802.11b[16]
  - Intel® 855 Chipset
- Microsoft® Windows® XP Home Edition
- 40GB hard drive[2]
- 10.6" widescreen XBRITE™ LCD display
- 512MB RAM
- Integrated CD-RW/DVD combo drive[4]
- Amazing battery life up to 7.0 hours (the longest battery life available in a VAIO® PC)[9]
- Integrated swivel camera
- VAIO Creation Suite Standard software package
- 1-Year Limited Warranty[3]

$2,199.99 As low as $55 per month for qualified customers.

UPGRADES
- Privacy Screen for $79.99
- VAIO® Standard Lithium Ion Battery[9] for $299.99
- Sony VAIO® Double-Capacity Lithium Ion Battery[9] for $349.99

Call or visit us online to find out about going mobile—and wireless—in style.

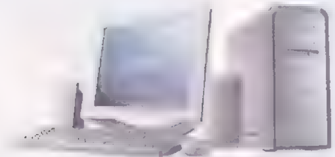
centrino MOBILE TECHNOLOGY

A world of entertainment possibilities.

Sony recommends Microsoft Windows XP Media Center Edition

SONY VAIO DESKTOPS

Sony VAIO Desktop PCs with Intel Processors are designed to [illegible]



Display sold separately

RS Series

[illegible]

PCV-RS400C—Display sold separately
- Intel Celeron Processor 2.20GHz
- Microsoft Windows XP Home Edition
- 80GB Hard Drive (7200 rpm)
- 256MB DDR at 266MHz
- DVD±RW Drive
- 64MB Intel 845GV Integrated Graphics
- Stereo speakers
- VAIO Creation Suite Standard software package
- 1-Year Limited Warranty

$699.99 As low as $18 per month for qualified customers.

UPGRADES
- Upgrade to a 120GB Hard Drive for $40
- 3-Year Limited Warranty for $199

SONY CLIÉ HANDHELD

Transfer data from your desktop and take it on the road with you.

PEG-UX50

[illegible]

Integrated Wireless LAN (802.11b)[17]
Integrated Bluetooth Wireless Technology[10]
310,000 pixel digital camera
Video playback (MPEG4, 30 fps)
Built-in MP3/ATRAC3 Player[11]
Built-in voice recorder
Built-in QWERTY-layout keyboard
480 x 320 high-resolution TFT color display
SwivelScreen design
Palm OS v5.2 software[12]
FREE shipping[20]

FREE

$649.99 As low as $17 per month for qualified customers.[13]

V Series

[illegible]

PCV-V100G
- Intel Pentium 4 Processor 2.4BGHz
- Microsoft Windows XP Home Edition
- 80GB Hard Drive (7200 rpm)
- 512MB DDR at 333MHz
- CD-RW/DVD-ROM Combo Drive
- 15" LCD display
- Wireless keyboard & mouse
- Built-in stereo speakers
- Giga Pocket Personal Video Recorder
- 1-Year Limited Warranty

$1,599.99 As low as $40 per month for qualified customers.

Display sold separately

RZ Series

[illegible]

PCV-RZ40CG—Display sold separately
- Intel Pentium 4 Processor with HT Technology at 2.40GHz
- Microsoft Windows XP Media Center Edition
- 160GB Hard Drive (7200 rpm)
- 1GB DDR at 400MHz
- DVD±RW/DVD-ROM Drives
- 128MB nVIDIA GeForce FX5600 Graphics Card
- Creative Inspire 5.1 5200 Speaker System with Sound Blaster Sound Card
- Multi-Media Card Reader
- Personal Video Recorder powered by Giga Pocket Engine
- 1-Year Limited Warranty

$1,789.99 As low as $45 per month for qualified customers.[13]

UPGRADES
- Upgrade to a 200GB Hard Drive for $80
- 3-Year Limited Warranty for $199

SONY VAIO® PC PERIPHERALS

What better way to save, edit and share your music, photos and video than with Sony electronics and your VAIO PC. After all, they're made to work seamlessly together, making your VAIO computing experience that much simpler.

[illegible]

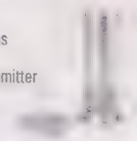
DCR-DVD300 DVD Handycam® Camcorder

1/4.7" 1.0 Megapixel Advanced HAD™ CCD Imager
3.5" SwivelScreen™ LCD display
Digital Still Memory Mode
Carl Zeiss Vario-Sonnar lens
Super NightShot Infrared System and Color Slow Shutter
Super SteadyShot Picture Stabilization System

FREE

$1,099.99 As low as $28 per month for qualified customers.

[illegible]



SRS-RF90RK 900MHz RF Wireless Speaker System Receiver and Transmitter

3 transmission channels
Automatic tuning
Built-in 4-watt amplifier
Up to 3.5 hours of operating time
Signal reception area of 150 feet
Built-in rechargeable NI-CD battery

$179.99

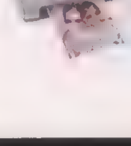
[illegible]

DSC-U50 Cyber-shot® Digital Still Camera

Available in black, silver and metallic orange
1/2.7" 2.0 Megapixel Effective Super HAD™ CCD
Rotating lens housing (swivels 120° forward and 90° back)
Fast start-up (0.9 sec.)
Red-Eye Reduction
Memory Stick Duo™ Media

100

$249.95



FREE SHIPPING/FREE PRINTER

GET FREE SHIPPING AND A FREE EPSON PRINTER (AFTER MAIL-IN REBATE) WHEN YOU BUY AN ELIGIBLE PC DIRECT FROM SONY

CALL 1-877-572-SONY [7669]
VISIT www.sonystyle.com/cpu

sony style

Sony recommends Microsoft® Windows® XP Professional for Business.

PC Magazine readers give [illegible] for Overall Desktop [illegible]

PC Magazine *16th Annual Service and Reliability Readers' Survey—August 5, 2003*

Sony VAIO RZ Series Desktop

The Sony VAIO® RZ Series Desktop PC is the ultimate multimedia performer. Rip through the most demanding applications, such as video editing and digital imaging, with ease. The raw processing power, combined with exclusive Sony software, opens up endless possibilities.

Shop Sony Style℠–and get it the way you want it.

The universe of Sony VAIO® PC products and software solutions is waiting and ready. Whether you shop at the Sony Style online store or by phone, it's your source for information, insights and inspiration, plus special savings and exclusive offers. For the latest products and innovations, expert advice and secure purchasing, go to the source: www.sonystyle.com or call us today. **Sony VAIO® RZ Series Desktop with Intel® Pentium® 4 Processor with HT Technology.**

intel inside pentium 4

easy financing

- Same as cash financing[13]
- Quick credit decision
- Low monthly payments

unsurpassed selection

[illegible]

expert help

[illegible]

exclusive offers

- Special memberships–Musiclub, ImageStation[6] online service and Screenblast[6] entertainment service
- Accessory items
- Much more!

FREE SHIPPING/FREE PRINTER

GET FREE SHIPPING[1] AND A FREE EPSON[2] PRINTER[3] (AFTER MAIL-IN REBATE) WHEN YOU BUY AN ELIGIBLE PC DIRECT FROM SONY.

CALL **1-877-572-SONY [7669]**

VISIT **www.sonystyle.com/cpu**

Call or visit us online at www.sonystyle.com and create the perfect system to meet your needs.

[illegible]

by Alex St. John

My Time In China

I'm sitting in a meeting with a small Beijing game developer talking about hiring them to develop online games for my company. They don't speak English very well, and the only Chinese I know loosely means "No Rolex for me thank you!" That means we're communicating through an interpreter.

They claim to be experts in building 3D video games, but as yet I've seen very little indication that China has any such expertise. After several awkward attempts to communicate that I would like to see some examples of their work they fire up a demo of a beautiful but dated underwater 3D scene. "This is your work?" I ask. "Yes" assures the interpreter, but the Chinese have a way of saying "yes" when they mean "I don't understand." So I ask another way. "This is very good, where did you have the artwork for this demo done?" The interpreter informs me that they work with several local 3D art studios and that one just down the street did this demo for them. "That's interesting," I say, "because I bought the company that actually made that demo three years ago and it belongs to me."

An expression of horror crosses their faces as the interpreter explains what I have just said, followed by a rush of excuses. The meeting is a short one. This is the seventh game developer I've met with in China. My leg has been pulled so often at this point that I've got a limp.

> My leg has been pulled so often at this point that I've got a limp.

You'd hardly know Shanghai was located in a communist country. It looks like a city out of "Blade Runner," towering sci-fi-looking skyscrapers brightly lit with animated Technicolor neon. Even the parks aren't green enough here because there's nothing like bright-green spotlights on every tree to bring out the natural colors of the foliage. The locals say that none of it existed 10 years ago. The economy has just been growing at 20% a year. U.S.-educated Chinese businessmen have been returning from Silicon Valley to create new enterprises. Silicon Valley VC's have set up shop in China and are funding startups, anticipating a technology boom of "dot-com" proportions.

The online businesses are very different in China: People have less disposable income and no credit cards. Billing for Internet ecommerce transactions is done through the phone carriers. If you want to buy something online, you get a phone number and code to punch in, and the charge appears on your next phone bill. People pay for their Internet connections by time, so the ISPs share revenue with the content providers based on how long a user spends on a particular content provider's site. It's much easier for budding entrepreneurs to start businesses and begin collecting money immediately.

In Taipei, where the Taiwanese government has given capitalism free rein, you can see what China will be like in another 10 years. Where Beijing's streets were full of old diesel smoke spewing trucks and antiquated bicycles, Taipei's streets are occupied by modern compact cars and scooters. The area of Taipei I was staying in had an electronics district that would make a geek's eyes bleed to see it. It was a computer modder's paradise. Every kind of case, monitor, video card, digital camera, chip, and gadget you could imagine was for sale in row after row of small shops and electronics malls. I counted several dozen flavors of designer thumbdrives at one shop ranging from 2GB drives to a USB thumbdrive/802.11g combo device . . . had to have one of those.

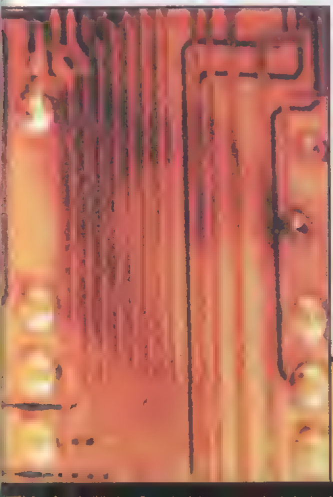
None of this compared to the Chinese cell phone mania. The smartest, most expensive cell phones we get here in the United States are prehistoric bricks compared to the cell phones available in Asia. They are wafer-thin and record video and play MP3s and are so cheap that they're nearly disposable. Everywhere I went you could see people interacting with their phones, mostly text messaging one another. Reception was also incredible. I got better cell phone reception 90 miles from civilization on the Great Wall Of China than I get here in Washington living a few miles from AT&T and Verizon's cellular HQ.

By the way, the game developer we found in Taipei actually knew how to write a 3D game, which was a great relief. ■

Send your thoughts to TheSaint@cpumag.com.

Holiday Wish List

1. GPS navigation for my Harley
2. Decent cell phone reception
3. ThumbDrive that will hold a DVD
4. Intel to stop shipping weak 3D chips
5. Wireless RGB to my TV
6. George Bush to declare war on SPAM
7. Doom III
8. A 20- x 40-foot wall to project it on
9. Treadmill support, complete with shotgun
10. Smaller thumbs for my Blackberry



Dream Hardware

Dream Hardware cleaves to the ideal of technological innovation, simultaneously cleaving your expectations into bits. Two gadgets this month hew close to the typical DH fare yet also hew the already ragged edge of technology. One device injects particles into the air to display an image; another digitally removes particle reflections to clarify an image. You can ponder this riddle or simply dream on.

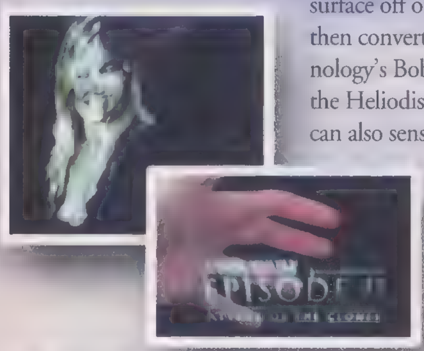
by Marty Sems

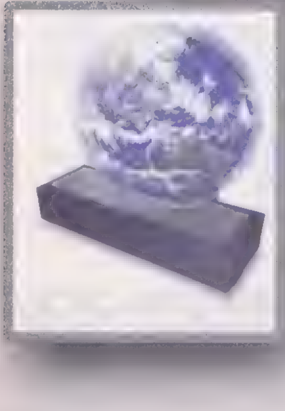
Siemens EasyControl

Your significant other slides into the passenger seat of your new car and immediately complains that your radio doesn't work. "You don't know the right sigil," you tell him while tracing a secret character on a control knob between the seats. The radio springs to life irrevocably tuned to NPR; he decides you're a magickal womyn of mystery, and you are spared his tedious "bluh-bluh-bluh-BLUHHHHH" brand of rock. Siemens VDO Automotive AG has invented the EasyControl, which starts with a programmable knob and buttons for tactile radio or navigation system control. To encourage you to keep your eyes on the road, the EasyControl knob also has a touch-sensitive pad with handwriting recognition capability. And we do mean handwriting. You can assign commands or passwords to characters you "write" on the knob with your fingers. EasyControl speaks the command or character out loud to confirm, and it can even read your email to you. At press time, Siemens hadn't announced any automotive partners for the EasyControl or how much the option might cost (www.siemens.com). Of course, all this is just a rest stop on the road to real voice-command recognition, which Siemens is also developing.

IO2 Technology Heliodisplay

The Heliodisplay isn't the first device to project a display onto what appears to be thin air. It may be one of the first that is directly interactive, though. "Ambient air comes in, is transformed, ejected out to create a surface off of which photons can reflect, and then converts back into air," says IO2 Technology's Bob Ely. Whatever secret particles the Heliodisplay adds to the air, the device can also sense penetrations in the projection field, such as probing fingers. That means you can interact with "screen" objects by touching them. One 27-inch prototype is in the bag, and Ely says IO2 is currently building three 42-inch Heliodisplays to demonstrate the technology's scalability. Specs listed in the IO2 site's development area include 1,600 x 1,200 resolution, 16 million colors, and a 300:1 contrast ratio (www.io2technology.com). Ely says future commercial models may rival plasma displays of similar size in price. In the meantime, Ely says the company is open to the idea of building one-offs starting at $22,500 for customers of substance.





D-MIST

Creepy storytellers from Samuel Taylor Coleridge to Ed Wood understood that there's nothing quite like a sinister fog to seriously freak people out. Unfortunately, researchers at the University of Manchester Institute of Science and Technology in the United Kingdom have dealt creepiness a telling blow. They came up with a 1U-tall device that offers the next best thing to X-ray vision in foggy, rainy, smoky, or hazy conditions. The D-MIST "demists" a video camera image in real-time by removing light reflected by the water droplets or particles in the intervening air, leaving a full-color signal that infrared cameras can't match. The researchers have formed a company called Dmist Technologies to commercialize the device for airports, sportscasters, and nautical uses (about $3,312; www.dgraham.dsl.pipex.com/dmist/home.html). Speaking of nautical uses, if you don't own a D-MIST and a good outboard motor, leave the poor albatrosses alone.

Mighty Memory

Our High-Performance Roundup

In the pursuit of the fastest, baddest PC ever to grace your desk, $400 or so for 1GB of memory should be no problem. Of course, this won't be any old pair of DDR modules but a pair of 512MB PC4000 sticks running at 500MHz. Until fairly recently, there was no such thing as PC4000 memory. The highest speed industry standard for DDR memory is PC3200, but as pressure and demand from overclockers mounted, memory vendors responded with ever-higher tweaks and speed-binned components. We decided to see firsthand not only who rules the memory performance roost but also talk with several sources about high-performance memory and the technical issues that should matter to enthusiasts.

What You Should Know

In every discussion of high-end memory, someone inevitably asks, "But do these higher specs really make a difference in real-world apps?" The answer is yes. Faster memory does yield improved overall performance across a wide range of applications, both "real" and synthetic. You'll see the best gains, though, when a synchronous (1:1) fashion raises the CPU and memory buses.

"If you have to run the DRAM at something besides a 1:1 ratio, are you really speeding up the system?" asks Louis Kaneshiro, Kingston's senior technology manager. "You're making the processor run faster, but now you've slowed the memory. Sometimes when I go to shows, I'll see somebody overclock a Pentium 4 2.4C to 3.3 or 3.4, but he's running DDR333 and shooting himself in the foot. When you can run your memory in synchronous mode with the processor bus vs. with a multiplier asynchronously, we've seen 3DMark scores go up 300 to 400 points from that alone."

Vendor after vendor trumpeted the 2.4C as being the chip of choice for budget-conscious overclockers. While the processor is typically locked at a 12X multiplier, the FSB has more headroom than any chip in the Pentium 4 lineup, and it's not uncommon for users to achieve 3GHz speeds or higher. In fact, when you do the math, you see that a 12X CPU with an FSB setting of 250MHz is 3GHz, and because DDR memory is double-pumped, a 250MHz memory bus is effectively DDR500 or PC4000.

Designing modules that are not only stable at 500MHz but also compatible with most motherboards is no easy trick. Many PC4000 sticks require additional voltage above the usual 2.55V or 2.6V VDIMM BIOS default just to reach their advertised speed, never mind overclocking. Moreover, PC4000 is in the same boat PC3200 was in a year ago; adrift on the specification seas without a definite JEDEC (Joint Electron Device Engineering Council) spec to guide it. For example, we encountered some situations where a board would boot with Kingston HyperX PC4000 but not Corsair XMS4000.

"Our XMS4000 SPD is actually set up for 3700 simply because we couldn't write it for 4000," says Robert Pearce, Corsair application specialist. "No BIOS would have recognized it. PC4000 is a speed grade between speed grades. A real speed grade is in multiples of 33MHz—200, 233, 266. PC4000 is 250, and there's no translation table to the BIOS for that. So 3700 is the best we could do."

In an increasing number of motherboards, the BIOS will feature two or three predesigned speed settings, something like Standard, Turbo, and Ultra. We've encountered boards from Abit, MSI, and others that simply refused to boot when put into one of these fastest modes with DDR500 modules installed. Finally, we learned the truth from Abit. It seems that these accelerated modes were designed for DDR400 modules with comparatively low-latency capabilities. Abit's IC7-MAX3 features four speed modes, and the highest two force the DIMMs into a CAS2 setting. If your modules support CAS2, you're in great shape. However, the lowest CAS latency setting we've seen in a DDR500 module is 2.5. Thus, every time we would enable this combination, the board would die and require a BIOS reset.

"Those descriptive timing characteristics are more trouble than they're worth," says Lewis Keller, Mushkin technical services manager. "People have found that those are modifying not just memory timings but also chipset timings, and if those values aren't being explicitly stated, it's just trouble for us. You can't troubleshoot a 'Turbo' timing when you don't know what the timings are."

Also be aware than many boards underrate their voltages. You might set your CPU voltage to 1.65V, but the PC Health area of the BIOS could reveal a voltage of 1.60V or 1.62V. PC Health values are notorious for being approximate at best; if you really plan on pushing your components to the edge, expect that the board's internal diagnostics may not be padding the numbers in your favor.

Is it possible to fry your modules with too much voltage? Yes, but not as often as some industry sources might have you believe. Of the 10,000 modules Mushkin sends out per month, only one or two come back as being truly defective. Of these dead units, most aren't likely to be overvoltage victims because they tend to be Mushkin's value modules. Because less experienced users generally buy these, Keller suspects that problems, such as short circuits in the system (as from an extra metal standoff under the motherboard), rather than extreme overclocking are the real DIMM-killing culprits. Corsair CEO Andy Paul echoes this, adding that of the 1% of modules returned to Corsair each month, roughly 98% test out as being fine, signaling that the problem is elsewhere in the system.

To help prolong the life of your modules, memory vendors advocate taking a very gradual approach to configuring your DIMMs. We went through this process when testing each memory set. The idea is to start off slow and with default voltages, then gradually work your way up to peak speeds in small jumps; increasing voltage settings only as necessary when instability crops up. Simply unpacking your modules and setting them at a 270MHz frequency with 3V may prove stable, but you'd be better off doing thorough tests to find that you can achieve the same speeds at 2.85V or even 2.75V, which will generate less heat and help protect your parts.

Setting Up

Abit's reputation for quality boards and overclockability is legendary. So when we recently received the IC7-MAX3 (see page 27) for review, we used the board for our memory testing, as well. Without question, the board's overclocking tools were comprehensive. After an entire day of testing, though, we had to concede that we were hitting a ceiling in the FSB. At first, we were unable to clock the board at 260MHz. Doing so prevented the system from even lighting up. A recent BIOS update from Abit rectified this problem, but then we hit a new ceiling only about 5MHz higher. Long phone conversations with Abit's product manager got us up to about 270MHz, but we couldn't keep this speed stable.

We went back to memory vendors for their opinions. Most agreed that while the IC7-MAX3 was a strong performer, we likely had a slightly weak unit. The board of choice, they unanimously agreed, is ASUS' P4C800-E Deluxe. ASUS rushed us out a unit, but this introduced some restrictions on our testing. The VDIMM settings only go up to 2.85V. ASUS confirmed that this was done on purpose to help protect users from roasting their components. The CPU voltage settings, however, go way beyond the 1.75V that Intel suggested to us that we not clock past. (Ahem, not that anyone should ever overclock CPU voltage at all, of course.)

Making Sense Of Memory

You practically need a scorecard to keep track of the scads of numbers and rating schemes floating around for memory. Here's a quick take to keep matters straight.

DDR533	aka	PC4200
DDR500	aka	PC4000
DDR466	aka	PC3700
DDR433	aka	PC3500
DDR400	aka	PC3200
DDR333	aka	PC2700

On Intel's recommendation, we used an unlocked 3GHz P4C with the multiplier set to 12X so as to emulate a 2.4GHz chip and leave plenty of FSB overhead. We also used an ATI AIW Radeon 9800, Western Digital WDC1200 hard drive, and a Zalman CNPS7000-Cu CPU heatsink to help cope with the added processor voltages.

We deliberated about whether to tinker with latency settings. True, there's some speed improvement when you drop the latency times, but as Corsair's Pearce told us, "The faster you get, the less those latencies matter. I mean, next year DDR2 will start at CAS5." Most vendors advised us to run at their recommended timings, and that's what we did. If you want to experiment with your own DDR500 modules while overclocking, Mushkin's Keller advises keeping the RAS-to-CAS delay high (four clocks), Active-to-Precharge (also called Precharge) Delay shouldn't go below seven, the CAS should be no lower than 2.5, and the low limit for RAS precharge should be three.

Heavy overclocking is more effective when you lock in BIOS values. Even if the memory timings are set to grab their values from the DRAM's SPD (Serial Presence Detect), manually override this and enter the appropriate values, such as 3-8-4-4. Back in the frequency/voltage configuration screen, we set the multiplier to 12X and changed the DRAM Frequency to 400MHz. Leaving this setting in Auto mode would also generate a 400MHz frequency. However, ASUS cautioned us that the Auto mode may not maintain a synchronous link to the CPU bus as overclocking scales up. Forcing the 400 setting remedies this. With the Abit board, this is noted more clearly as a 1:1 setting ratio. Similarly, we changed the AGP/PCI Frequency from Auto to 66.66:33.66 just to ensure stability, as ATI cards are known for being finicky about AGP bus overclocking.

As you can see in our test chart, we started each dual-channel pair at 200MHz with a DIMM voltage of 2.55V and CPU VCore voltage of 1.55V, both common default settings. This was to establish a baseline and ensure that the modules were functional and compatible with our ASUS board. Because of conciseness and the imprecise craft of overclocking, we increased the DRAM frequency in hops of 5MHz. Even if we had been able to achieve a top stable configuration with, say, the OCZ modules at 272MHz, there are no guarantees that a duplicate set of components would achieve the same results. Thus, a 5MHz approximation will serve well enough here. In general, we tried to increase the CPU voltage one step for every step we jumped the DRAM voltage, although there were some unstable steps that we've omitted in our chart for brevity's sake. In general, we found that increasing CPU voltages had far less impact on overclocking stability than increasing DIMM voltages

In all cases, we left the Performance Acceleration Mode enabled and disabled every nonessential board feature, from the ports to speech POST reporter.

Corsair CMX512-4000PRO

We know; it's the lights that get you. Anyone with a windowed case loves some good bling-bling, and Corsair delivers with a line of green, yellow, and red LEDs along the top of the cast aluminum, Teflon-coated heatsink. In reality, the apparatus is measuring traffic along the RAS and CAS lines, so you really are seeing a loose representation of memory activity. The heatsink itself is a monster, and while there wasn't a board that we couldn't install these modules on, we came within 0.25 inches of hitting one CPU's HSF retention module clips, so watch your space. The heatsink size and ridges also serve to create nearly twice as much surface area as conventional heat spreaders for more effective dissipation. Also worth noting is that whereas most heat spreaders contact module chips through thermal tape and then clamp on with a spring, these 4000PRO heatsinks are bonded to the chips with special epoxy and then baked.

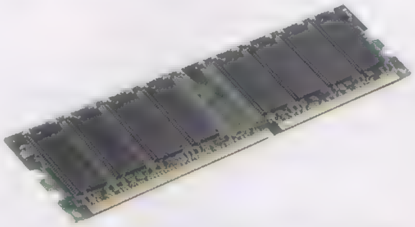
CMX512-4000PRO
$399 (1GB)
Corsair
www.corsairmemory.com

While the CMX512-4000PROs came in with a close second place in highest achieved benchmark scores, the fact that we could keep a stable configuration all the way up to 260MHz without touching any voltage settings is a testament to Corsair's brilliant engineering. (Interesting side note: When Corsair's CEO Andy Paul was busy telling us how his company scours the world for the fastest ICs, we commented that it doesn't take a rocket scientist to test for the fastest parts. He replied, "Funnily enough, the guy who designed our XMS modules actually is a rocket scientist. That's his hobby. He used to work at Lawrence Livermore Labs and now likes to build rockets out in the desert.") For those who want to keep heat and power consumption down to a minimum while getting top memory performance, no other vendor comes close to touching these DIMMs. Thus, if you're looking for top performance in a small enclosure, particularly a clear-paneled unit, the CMX512-4000PRO would be our first recommendation.

GL4000DC Ultra Platinum
$290 (1GB)
GeIL
www.geilusa.com

Crucial CT6464Z40B (PC3200)

At first, we were going to cut Crucial from this roundup when we discovered that it only makes modules up to PC3200 in order to stay in perfect JEDEC compliance. But when Crucial reps assured us that the modules were capable of considerable overclocking, we went ahead and got a pair for the test bench. Cosmetically, these DIMMs are a dud. They're just regular 16-chip, double-sided DDR modules without so much as a heat spreader to spruce them up.



CT6464Z40B (PC3200)
$186 (1GB)
Crucial
www.crucial.com

Now, you may look at our test results chart and blow off Crucial for not even being able to hit 250MHz. The highest stable configuration we reached was 240MHz, a 20% FSB increase. But consider that these 512MB sticks cost $90 each, or about $180 for 1GB, direct from Crucial. In contrast, as we wrote this article in mid-October, 1GB of Mushkin PC3500 memory with the black heat spreaders sold at NewEgg.com for almost $100 more. If you have a processor that can't tolerate an FSB setting of more than 240MHz, Crucial compares very favorably when you look at price vs. performance.

GeIL GL4000DC Ultra Platinum

When our GeIL tests crashed at only 240MHz with default voltage, we were afraid the vendor-stated timings of 2.5-7-4-4 were simply too aggressive—even though we hadn't yet reached the targeted 250MHz FSB. As it turned out, the modules were simply hungry for more power. They do have a lot of speed packed into them, but you'll need to experiment with your voltage settings to unleash it.

Moreover, we're concerned about which version of the modules you might receive. Early on, when we called GeIL to ask about our 240MHz instability, their reps didn't really answer our question; they merely sent us another set of modules. The second set performed the same as the first. In both cases, we were unable to achieve a stable configuration at anything higher than 255MHz. When we called back to note this, GeIL said there had just been "a PCB revision," whereupon we received a third set, and those delivered the numbers you see here.

With slick platinum heat spreaders and an attractive 1GB kit priced well under $300 on the street, these modules are decent performers, falling right in the middle of the PC4000 pack. In the end, though, we're a bit stumped by our GeIL results. We've read enough good news about this product that we expected a tough race against Corsair and OCZ, but the race never materialized. If we'd had only one pair of modules to test, we could have chalked it up to an unlucky draw from the deck. It's hard to argue with three sets of modules, though.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

HyperX HPX4000K2/1G
$316 (1GB)
Kingston
www.kingston.com

Kingston HyperX HPX4000K2/1G

Honestly, we expected Kingston to do better here. The company guarantees stable performance at 250/500MHz, and that's exactly what you get. With a fair amount of extra voltage, we even hit 260MHz. But the final scores were less than we'd hoped for.

Ultimately, we got an honest answer from one Kingston rep who told us that because of the U.S. tariff situation, Samsung chips were much more affordable than Hynix, and if you look at the top ICs in DRAM right now, Hynix generally takes top honors. Kingston has built its large empire on being the dependable brand of choice for the mainstream. That's where most of the profit dollars are, after all. So while Kingston faced growing pressure to create a high-performance family of modules, it had to balance this against cost considerations for a mass market. Thus, we have today's HyperX: good, affordable, stable, and well-supported, but not something an overclocker will brag about at the next LAN party.

To its credit, Kingston hit 250MHz while still operating at default voltages, and that blue heat spreader is sort of a refreshing change from the usual color schemes.

Mushkin PC4000 Hi-Performance Black

As with Kingston, we expected a little better showing from our Mushkin entry. With its fastest bus frequency topping out at 260MHz, the Mushkin PC4000s were a bit odd in that they seemed to benefit the least of any modules reviewed here from voltage increases. Stepping from a VDIMM of 2.55V to 2.65V gave us one little extra performance step, but anything above that was pointless, as was increasing the CPU voltage.

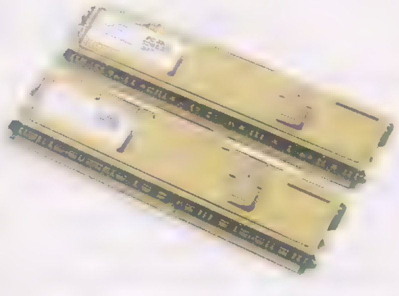
Mushkin traditionally notes its flagship Hi-Performance series with black heat spreaders, and it's a cool touch for aesthetic purists that the modules' PCBs are also black. We've seen on the Web that Mushkin is starting to produce a second generation of top-end modules with purple PCBs based on the same Hynix chips that Corsair's XMS4000PRO modules use. Why Mushkin elected not to send these for review is a mystery. Supply problems, perhaps.

In any event, don't let an average performance sour you on the Mushkin brand, which we've had excellent luck with in the past. If you're looking for ultra-fast DDR, watch for the purple series and price-compare it against Corsair and OCZ.

PC4000 Hi-Performance Black
$405 (1GB)
Mushkin
www.mushkin.com

OCZ OCZ5001024ELDCGE-K

OCZ boasted to us that it has the only CL2.5 DDR500 modules on the market. Well, because GeIL's PC4000 Platinum uses the same timings, we think OCZ should modify its claim (based on our tests) to: OCZ has the *fastest* CL2.5 DDR500 modules. The numbers don't lie. While OCZ's Gold Edition PC4000 couldn't match Corsair for stability and scalability at lower voltages, our highest-voltage settings showed OCZ as the only vendor able to crack 6000 in our Sandra tests, and it came only one point from hitting 5900 in 3DMark03. The choice of a gold heat spreader seems appropriate for this chart-topping champion. And despite Corsair's claims that most competing modules don't effectively dissipate heat, the OCZ500 modules running at 2.85V with a heavy load do get too warm to hold.



OCZ5001024ELDCGE-K
$386 (1GB)
OCZ
www.ocztechnology.com

The Gold Edition modules have been specially optimized by OCZ to run on Springdale- and Canterwood-based motherboards. Although our test parameters only extended up to a VDIMM of 2.86V, remember that OCZ warranties its Gold series up to 3V. Moreover, company reps hinted to us that settings of 3.2V and 3.3V, while not recommended, were not uncommon among hobbyists.

If you're working on an AMD platform, check out OCZ's EL DDR PC4000 modules. These are the CL3 units with copper heat spreaders. According to OCZ reps, these will deliver superior performance over even the Gold modules on non-Intel dual-channel boards.

The Winner Is

Hold on a sec. We need to get more comfortable sitting on this fence. . . . OK. If this were a pure performance test, we'd give the nod to OCZ; its Gold modules attained the highest bus speeds (at least it functioned on two out of three tests at 275MHz) and the highest raw benchmark scores and highest scores—barely, at the sticker-stated speed of 500MHz. However, Corsair has that killer heat spreader, better voltage efficiency, and nearly equal performance. We're going to call this round a tie between Corsair and OCZ. Which brand is best for you is going to depend on your hardware configuration, particularly the chassis, and your applications.

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

How Our Memory Matches Up

The following is a look at the benchmark scores we charted for the memory we tested, including notes on stability issues, points at which Windows crashed and our test system reset, and more.

Vendor	Module	Voltage DIMM/CPU	Frequency	PCMark 2002 Memory	SiSoft Sandra Memory Bandwith (Int:Float)	3DMark 03 Games
Corsair	CMX512-4000PRO	2.55/1.55	200	8459	4369:4358	5618
	3-8-4-4	2.55/1.55	225	9445	4858:4899	5738
		2.55/1.55	240	9958	5323:5324	5794
		2.55/1.55	250	10362	5461:5469	5831
		2.55/1.55	255	10522	5441:5610	5844
		2.55/1.55	260	10769	5659:5690	5851
	Won't boot at:	2.55/1.55	265			
		2.65/1.55	265	11634	6214:6269	crashed
		2.75/1.55	265	11298	6250:6271	5885
	Windows crashes at:	2.75/1.65	270			
		2.85/1.65	270	10898	5914:5918	5887
	System resets at:	2.85/1.65	275			
Crucial	CT6464Z40B (PC3200)	2.55/1.55	200	8456	4357:4372	5619
	3-8-4-4	2.55/1.55	225	9420	4950:4904	5732
	No boot at:	2.55/1.55	240			
		2.65/1.65	240	9908	5305:5230	5781
	Windows crashes at:	2.65/1.65	250			
		2.75/1.75	250	10337	5424:5473	crashed
GeIL	GL4000DC Ultra Platinum	2.55/1.55	200	8460	4391:4343	5614
	2.5-7-4-4	2.55/1.55	225	9427	4912:4953	5737
	Unstable at:	2.55/1.55	240			
		2.65/1.65	240	9693	5254:5253	5798
		2.65/1.65	250	10351	5512:5463	5829
	Resets at:	2.65/1.65	255			
		2.75/1.75	255	10572	5560:5591	5848
		2.75/1.75	260	10728	5668:5709	crashed
		2.85/1.75	260	10775	5778:5725	5860
		2.85/1.75	265	10938	5990:5921	crashed
Kingston	HyperX HPX4000K2/1G	2.55/1.55	200	8436	4370:4370	5621
	3-8-4-4	2.55/1.55	225	9406	4989:4897	5737
		2.55/1.55	240	9996	5347:5299	5799
		2.55/1.55	250	10376	5462:5482	5833
	Unstable at:	2.55/1.55	255			
		2.65/1.65	255	10261	5586:5578	5846
	No boot at:	2.65/1.65	260			
		2.85/1.75	260	10776	5667:5746	5866
		2.85/1.75	265	10926	5784:5789	crashed
Mushkin	PC4000 Hi-Performance Black	2.55/1.55	200	8441	4315:4325	5620
	3-8-4-4	2.55/1.55	225	9197	4907:4914	5735
		2.55/1.55	240	9790	5243:5247	5793
	Unstable at:	2.55/1.55	250			
		2.65/1.55	250	10368	5473:5459	5833
		2.65/1.55	255	10558	5601:5596	5847
		2.65/1.55	260	10720	5766:5812	5858
		2.75/1.65	265	10962	5766:5812	crashed
		2.85/1.75	265	10982	5881:5800	crashed
OCZ	OCZ5001024ELDCGE-K	2.55/1.55	200	8423	4301:4374	5615
	2.5-7-4-4	2.55/1.55	225	9471	5005:4919	5728
		2.55/1.55	240	10025	5226:5232	5785
		2.55/1.55	250	10379	5468:5514	5828
	No boot at:	2.55/1.55	255			
		2.65/1.65	255	10575	5561:5598	5850
		2.65/1.65	260	10725	5599:5677	5863
	Won't load Windows at:	2.65/1.65	265			
		2.75/1.75	265	10952	5782:5814	5877
		2.75/1.75	270	11134	5959:5950	crashed
		2.85/1.75	270	11144	6016:5927	5899
		2.85/1.75	275	11369	6088:6024	crashed

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Intel Pentium 4 Extreme Edition 3.2GHz

Pentium 4 Extreme Edition 3.2GHz
$740/1,000 units
Intel
(800) 628-8686
(408) 765-8080
www.intel.com

Just in time for AMD's launch of the Athlon 64 processor, Intel came out with its own top-end processor aimed squarely at the Athlon 64 FX-51. The Pentium 4 Extreme Edition stems from a similar place as the FX-51. Just as AMD pulled a server-based Opteron into the desktop market, Intel did likewise with the P4EE by transitioning an Xeon from the server side over to the desktop enthusiast sector.

The CPU itself looks just like all Northwood P4s that came before, but looks can be deceiving. Under the hood the P4EE has an additional 2MB of on-die L3 cache, as well as the usual 512KB of L1/L2 cache. Often seen as a quick-fix approach and a useful, if somewhat expensive, way of improving performance under memory-intensive situations, stacking more chips on the cache side is a tried-and-tested method. The extra 2MB of L3 cache isn't in the same league as a real on-die memory controller in terms of the performance benefits seen with the Athlon 64, but it does help reduce memory latency. Clocked at 3.2GHz, this P4 also has a massive total of 169 million transistors, Hyper-Threading support, and everyone's favorite 800MHz FSB. There are rumors surfacing that Intel may well choose to enhance all of its future P4 lines with limited quantities of Extreme Editions.

The P4EE bridges the gap between the regular P4 and the Athlon 64 FX pretty closely. (Check out our benchmarks at www.cpumag.com/cpudec03/cpus.) It's a very close race, but apart from Quake III, the FX-51 wins in more benchmarks than the P4EE. Needless to say, either of these two CPUs would make any gamer extremely happy. The good news with the Pentium 4 3.2 EE is that it won't require a change of motherboard and will in fact work with all Socket 478 Pentium 4-based boards requiring only a simple BIOS update. This makes the move to this CPU cheaper than the FX-51, which requires a new mainboard and memory. The bad news is the price: $740 in 1,000-unit quantities is far from being affordable, but that's the price you pay for a newly introduced high-end CPU these days.

The P4EE is due to be released by the time you read this, but don't expect to be able to easily locate one; it will be available in very limited quantities, just like the Athlon FX-51 it will be going up against. A great idea and executed in a timely fashion, the P4EE is a welcome distraction until the new processor based on the 90nm Prescott core arrives. ▲

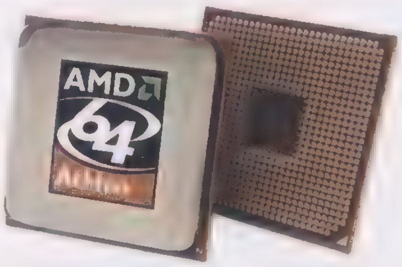
by Alex "Sharky" Ross

AMD Athlon 64 3200+

Athlon 64 3200+
$410
AMD
(800) 538-8450
www.amd.com

Last month, we were in the dizzy heights of bliss playing with the somewhat limited-production AMD Athlon 64 FX-51, but now it's back to reality and into the mainstream as we take a closer look at the Athlon 64 3200+.

This is actually the 64-bit processor, for a long time known as "ClawHammer," with a smaller 754-pin count than the FX. The 64 3200+ is also smaller in the memory controller department, sporting a single 64-bit channel as opposed to the FX-51's 128-bit dual channel, which means that its bandwidth is halved from 6.4GBps to 3.2GBps. The on-die memory controller still tackles latency well and supports the more standard unbuffered DDR memory at speeds up to DDR400. The cache allocation is the same as the FX-51 with 1MB of L2 and 128KB of L1. Sadly, the price isn't quite halved, but at least it's a much more affordable $410 instead of the FX's $725. The same 0.13-micron SOI (silicon-on-insulator) process is used for the entire Athlon 64 line with a 193mm ^{2} die size and 105.9 million transistors.



The Athlon 64 3200+ is clocked at 2GHz (200MHz HyperTransport clock multiplied by 10x clock multiplier), which, according to AMD's performance ratings, brings it in line with the performance of the P4 3.2GHz. It also means that if you already own an Athlon XP 3200+ based on the K7 architecture and don't have an immediate use for 64-bit computing, you needn't spend the dough to upgrade. The benchmarks (www.cpumag.com/cpudec03/cpus), while impressive, are more indicative of a mainstream product. Hardcore gamers will want to go for the peppier and pricier FX-51 if they can find one.

A 3400+ Athlon 64 is due out before the year's end, so it might be worth waiting to upgrade around that time. It will also be clearer which socket-754 chipset will be the best performer. Right now, it's early days yet, so NVIDIA (we used the nForce3 for the purpose of this review), VIA, Ali, and SIS are all bustling away with their chipsets, encouraging reviewers to try out new BIOS updates and the like. ▲

by Alex "Sharky" Ross

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

ATI Radeon 9800 XT

Last month, we gave you the skinny on ATI's top-dog 3D graphics card, the Radeon 9800 XT. Since then, ATI has finalized the details, and the board should be on store shelves by the time you read this. Based upon a revamped R350 0.15-micron core, dubbed the R360, the 9800 XT's engine clock speed has been finalized at 412MHz. The 9800 Pro's clock speed is 380MHz, so the XT gets roughly an 8% bump. This doesn't seem like a lot, but if you remember that ATI is still on 0.15-micron fabbed by TSMC, it's amazing the company can ramp up at all.

Video Card Scores (at 4xFSAA, 8xAF)	ATI Radeon 9800 XT	ATI Radeon 9800 Pro	NVIDIA GeForce FX 5900 Ultra
Quake III (High Quality)			
1,600 x 1,200	128.8	116.8	125.4
Unreal Tournament 2003 Flyby			
1,600 x 1,200 x 32	39.4	37.7	34.1
X2 Demo			
1,600 x 1,200 x 32	27.1	24.2	29.4
Serious Sam TSE			
1,600 x 1,200 x 32	41.3	34.9	43.7
Splinter Cell			
1,600 x 1,200 x 32	38.2	35.35	31.73
Aquamark 3			
1,600 x 1,200 x 32	30.1	27.2	22.3

Despite ATI having put more emphasis on engine clock speed improvements as opposed to memory bandwidth limitations during our meeting last month, we won't argue with the company turning the speed knob a jar while increasing the size of the frame buffer from 128MB to 256MB. Our reference 9800 XT came with extremely zippy 365MHz DDR memory (effectively 730MHz). ATI's decision to go with a 256-bit memory interface from the outset with R3xx architecture was key and now pays dividends with a massive 23.3GBps of total memory bandwidth on tap for the 9800 XT. The internals of the architecture remain the same as previous R3xx architectures and harbor eight pixel pipelines, programmable shaders, F-buffer logic, etc.

The XT's speed bumps have meant that ATI's engineers have been put to work in order to make some very visible (see image) physical changes to the design of the board. Running such high clock speeds on a 0.15-micron core isn't easy, as evidenced by the size of the reference design fan and copper heatsink cooler (on both sides). The end result is audible but much quieter and smaller than previous NVIDIA contraptions. The board is still a single-slot solution that will fit perfectly in a Shuttle XPC box. A thermal diode is mounted on the package that will communicate on the fly with new ATI drivers to enable "OverDrive." This feature basically monitors the chip's temperature and adjusts the clock speed and fan speed accordingly. Overclocking will play a big part in ATI's next public driver release, and the R360 is apparently friendlier than its predecessors in that department.

For now, ATI has quite simply done enough to further enhance its lead at the very top of the 3D graphics market. At $500, the 9800 XT won't exactly be flying off the shelves, but it does ATI's reputation no harm at all, and just as there will always be customers willing to pay more than $100K for a sports car, there will be a similar band of brothers willing to part with $500 for a 3D graphics card (slap myself on the forehead) in our world. If you want the very best currently, the 9800 XT is the right choice.

Obviously if you already own a 9700 Pro or a 9800 Pro, stick with it; the performance gains just aren't worth it yet, and you're already in very good DX8 and DX9 hands. You still have eight pixel pipelines and just slightly lower clock speeds, so dabble with overclocking, which will be a "free" upgrade with the imminent release of the Catalyst 3.8 drivers. If you're stepping up from a DX7- or DX8-class product, the best bang for your buck will probably be a non-XT 9800 Pro, which will now have a hefty price cut thanks to the XT taking up the podium. If that's not enough candy, ATI will also be offering a coupon for the full single-player version of Half-Life 2 because plans for the bundle had to be postponed due to a delay with the release of the game.

Radeon 9800 XT
$499
ATI
(905) 882-2600

The recent addition of ASUS as an ATI OEM partner will certainly help the numbers game, as will Dell's endorsement of the Radeon lineup, but it won't be smooth sailing for ATI because NVIDIA's NV38 is also just around the corner with the promise of improved drivers. However, the boys from Canada have once again come out first to market, so the holiday season battle is being won on that front, if not the actual war. The war itself will be fought in the trenches with the $200 products due out soon from both ATI and NVIDIA. Early indications are that the 9600 XT should stack up very well against NVIDIA's NV36, but we'll reserve full judgment until we get both in for a comparison. ▲

by Alex "Sharky" Ross

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

New NVIDIA GeForce Technology

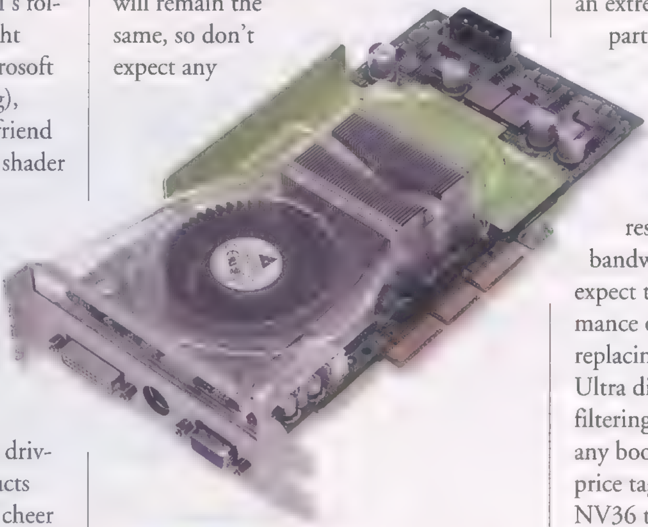
GeForce FX 5950 Ultra (NV38)
GeForce FX 5700 Ultra (NV36)

It's been a tough year for the lean green fighting machine (that's NVIDIA) in Santa Clara, as the company still hasn't won back the 3D performance crown, which it lost to ATI's R300 architecture. Along the way, the NV30 was noisy, late, and quickly replaced by the NV35, which was again not quite as peppy as ATI's follow-on R350. Whereas DX8 brought NVIDIA to the forefront with Microsoft (not to mention that li'l Xbox thing), DX9 has not been NVIDIA's best friend to date. The politics of whose pixel shader implementation is cleaner, whether optimizations are actually cheats, if the FP32/FP16 combo is better in principle but more hassle in practice than ATI's DX9-spec FP24, and the whole Half-Life 2 media layer cake have wound things up considerably.

The announcement of improved drivers and two new GeForce FX products may provide the additional holiday cheer we've come to expect. Enter the NV35's successor, NV38, and the much-needed NV31 replacement, NV36.

NV38. Kicking off with NV38, NVIDIA has basically taken the 5900 Ultra; dressed it up in a new, quieter heatsink and fan combo; and pumped up the clocks a little, calling it the GeForce FX 5950 Ultra (pictured here). Both the engine core clock and memory clocks are matched at 475MHz (memory is effectively 475 x 2 or 950MHz), giving this new high-end part a 4% boost to the core and an 11% clock increase for memory over the NV35. The memory itself sports a 256-bit interface and carries 256MB worth of DDR RAM, which matches up nicely with ATI's 9800 XT. It seems that while ATI and NVIDIA disagree on many things currently in the 3D graphics market, one area that they seem to be in sync on is that 256MB seems to be tailor-made for the very high end where gamers want to be playing at 1,600 x 1,200, as well as helping to justify a $499 price tag.

NVIDIA has also improved the total available bandwidth to a beefy 30.4GBps. But the architecture itself will remain the same, so don't expect any doubling of the pixel pipelines from four to eight this time around. NVIDIA will be relying on greater clock speeds and improved optimization of pixel shader performance in its new drivers to take on ATI's 9800 XT. Significantly quieter than what's come before, the HSF solution for NV38 is a much improved design but will still require that the board take up two slots. Boo.



CPU First Look PREVIEW

GeForce FX 5950 Ultra (NV38)
GeForce FX 5700 Ultra (NV36)
$499/$199
NVIDIA
(408) 486-2000
www.nvidia.com

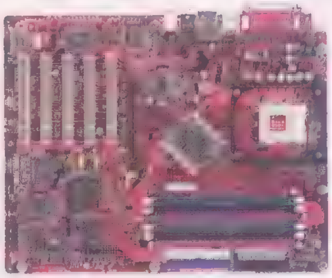
NV36. Most essential for NVIDIA will be how its new mainstream product, based upon the NV36 core, stacks up against ATI's Radeon 9600 XT. The NV36, also derived from the NV35 architecture and toting the label of GeForce FX 5700 Ultra, sees for the first time NVIDIA's manufacturing partnership with IBM bearing fruit. Using IBM's 0.13-micron process should help fulfill NVIDIA's yield needs better this go-round. TSMC will still carry on fabbing chips for NVIDIA, but as the saying goes, two heads are better than one, especially when it comes to the dicey 0.13-micron process, which contributed to NVIDIA's NV30 slip last year.

The NV36 engine clock will be set to an extremely aggressive (for a mainstream part) 475MHz, just one benefit of being on 0.13-micron. The 128-bit memory interface will have 128MB of onboard DDR2 memory set to 450MHz on tap, dishing out a respectable 14.4GBps worth of bandwidth. NVIDIA claims we should expect to see up to 1.5 times the performance of the 5600 Ultra, which it is replacing for the mainstream. The 5600 Ultra did lag when it came to anisotropic filtering and anti-aliasing performance, so any boost is most welcome. With its $199 price tag, it is vital for NVIDIA that the NV36 take on the 9600 XT pound for pound, as the mainstream sector is where the real money is made. Unlike the NV38, the NV36 is closer to being a "new" chip per se and more than just a speed ramp.

Both new boards will support AGP 8X, but it's worth noting that NVIDIA stated during our briefing that its NV40 architecture will support the newer/faster PCI Express standard in its full line of products for the first half of 2004 (even if ATI did beat NVIDIA to the punch by showing off a PCI Express board at this year's IDF). We'll have both boards in for review next month, by which time NVIDIA is planning to have its new order on store shelves. You'll have to wait for 2004 to see the battle between the R400 and NV40 architectures. ▲

by Alex “Sharky” Ross

DFI 865PE INFINITY



865PE INFINITY
$129
DFI
(916) 568-1234
www.dfi.com.tw

Everybody who's anybody now has a Springdale-based board or two in their product mix, and while DFI was later to the game than most, the time was not wasted. DFI has clearly spent a lot of time tweaking the platform to get the maximum possible performance. Check out our first-look Springdale roundup on page 60 of the July *CPU* and you'll note that the 865PE INFINITY handily spanks those early 865 releases by 10% to 15%, albeit with a slightly updated test platform.

Although the INFINITY is stripped down compared to the LANPARTY, there is still plenty here to please the power user. DFI integrates the rear and bass/center jacks alongside the standard mic/line-in/line-out jacks, plus you get RCA-style SPDIF-in and SPDIF-out. The backplane also features four USB 2.0 ports (two additional headers on-board; extensions not included), one 1394a port (ditto for two more FireWire headers sans extensions), and one 10/100/1000 RJ45 port. A Silicon Image chip enables RAID on both pairs of SATA ports. The utility CD loads up in a snap, and setup went flawlessly.

Our first set of benchmark numbers was taken with the BIOS set to default values. The second set has Super PATCH, DFI's tweak for enabling Intel's PAT (Performance Acceleration Technology), turned on. As you can see, Super PATCH delivers the goods, boosting several scores by 5% to 10%.

When I set the BIOS to Fast or Turbo modes, though, the board refused to boot with Kingston HyperX and other top-end modules from Crucial and Corsair. I had to step down to Kingston ValueRAM in order to achieve a functioning Turbo mode. Hopefully, DFI will release a fix in short order.

Special note should go to the board's new CMOS Reloaded feature. This is a nifty tool that lets users save different BIOS setting configurations and boot with them via a hotkey during posting. You might have a conservative setting for everyday apps and an OCed setting for gaming. Most people will ignore this, but it's still a clever idea.

With great performance in default mode, a respectable feature set without gimmicky bells and whistles, and a very fair price, the 865PE INFINITY proves that DFI is on the right path to being a top-tier mobo vendor. ▲

by William Van Winkle

ABIT IC7-MAX3

IC7-MAX3
$210
ABIT
(510) 623-0500
www.abit-usa.com

A feat of technical engineering akin to fine art, ABIT's IC7-MAX3 is a stunning example of everything the Intel platform should achieve. Consider the construction: The first thing that catches your eye is ABIT's new OTES (Outside Thermal Exhaust System), a translucent blue plastic tube that encloses the board's power circuitry and feeds to a near-silent blower fan. I've seen some PCBs get hot enough under the power area to melt plastic, so pushing this heat outside of the chassis is a brilliant move. The two IDE connectors are turned 90 degrees so that flat cables don't obstruct airflow to the board. The 12V ATX power connector sits nice and high next to the four color-coded, dual-channel DIMM slots where it won't drape wires across fans. And—at last!—there are no serial or parallel ports on the backplane.

ABIT isn't stingy with features, either. On top of the dual SATA RAID provided by the Intel ICH5R southbridge, ABIT throws on a Sil3114 chip and another four SATA connectors configurable as RAID 0, 1, or 0+1. The Gigabit chip is genuine Intel, and the 5.1 audio comes courtesy of Realtek. In addition to the PS/2 and GbE ports, the backplane features in and out optical SPDIF, one six-wire FireWire, four USB 2.0, and all five audio jacks. Winbond's hardware monitoring app comes on the app/driver CD, and you can download the Windows-based Award BIOS flash utility from ABIT's site.

The IC7-MAX3's performance is excellent but not record-setting. The benchmark results of the IC7-MAX3 in Turbo mode are about the same as DFI's 865PE INFINITY with Super PATCH enabled, and DFI costs almost $100 less. (See www.cpumag.com/cpudec03/abit for the benchmark results.) Now, ABIT is renowned for its superlative flexibility in overclocking, easily hitting 280MHz and even breaking 300MHz, which easily dusts DFI's track record. One snag I hit on the MAX3 board, though, is its Gaming Acceleration BIOS modes. While the Auto and Turbo modes worked fine, the Street Racer and F1 modes would not work with any of the modules I tried. According to ABIT, this is because the higher settings push modules down to CAS2, which is beyond the range of both "value" DIMMs, as well as performance modules, which trade slower latency settings for faster bus rates.

Whether you're here for the out-of-the-box stability, overclocking, SATA RAID, data encryption, cooling, or any of the IC7-MAX3's many other benefits, this board is worth its price and sure to please. ▲

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Biostar iDEQ 200P

iDEQ 200P
$339
Biostar
(626) 581-1055
www.biostar.com.tw

CPU CPU CPU CPU

Biostar's iDEQ line continues to impress and push itself to the fore of the SFF pack. The 200P is Biostar's showcase for the 754-pin Athlon 64, and if you take a look at last month's Athlon 64 mobo roundup (November *CPU*, page 60), you'll find that the 200P actually outperforms *all* of its desktop brethren, albeit by a slight margin. This is one fast, black-lacquered beast.

I only encountered two problems with this box: The first is a glitch somewhere in the memory subsystem. Running tests individually in PCMark 2002 worked fine, but doing our usual batch run of CPU, memory, and crunch tests locked up the system regardless of memory vendor. (See the benchmarks at www.cpumag.com/cpudec03/biostar.) The second is that when setting up a SATA drive as the only hard drive in the system, the SATA ROM option in the BIOS must be enabled. If you only enable the SATA controller, you'll wonder why Windows only gets partway into its installation before erroring out.

Otherwise, I have nothing but glowing praise for the 200P. As with past iDEQs, the cooling system is a marvel of quiet and efficiency. (With the 200P, Biostar added a thin, three-sided plastic shim to help tunnel hot air from the CPU heatsink into the blower fan even more effectively.) Cabling is still tastefully channeled through hidden chassis passages, and, unlike with the 200T, I had no trouble reaching power to the rear of my ATI card. The thumbscrew-mounted, detachable 3.5-inch drive cage can hold two drives. Add this to the main cage for external drives, and the 200P can hold not only a burner, but up to three hard drives—good news for anyone wanting to take advantage of the VT6420-based SATA RAID feature.

The unit's exterior is well-fashioned, complete with three separate, thumbscrew-secured panels coated in a matte black finish that resists fingerprints. The front plate features one six-wire 1394a port, SPDIF-out, headphone and mic, and two USB ports. In the back, you get a repeat of this plus a Gigabit LAN jack, the PS/2 ports, and two 9-pin serial ports. (A joystick port or RCA-type SPDIF connectors might make more sense than serial here.)

You might snag the 200P on the strength of its test scores or cosmetics. Personally, I like the unit best for its super-easy setup and excellent interior design. Either way, buyers will not be disappointed. ▲

by William Van Winkle

Nimble Microsystems V5

V5
$699
Nimble Microsystems
(408) 861-8008
www.nimblev5.com

CPU CPU CPU CPU

Despite the media blitzkrieg from Intel and AMD, most of what we compute requires megahertz, not gigahertz. My main PC is a raging beast; my second, third, and fourth PCs are kittens designed for handling basic tasks (such as email, photo editing, and office apps) in necessary locations, and this is where a VIA box makes excellent sense.

The Nimble V5 packs a lot of value into that $699 price tag. For starters, the little box is optimized to be a videoconferencing station, including a full duplexing (echoless) integrated speakerphone and a mute button with LED indicator on the front panel. (You can add a Logitech USB Web cam for $50.) With two LAN ports, the V5 acts as a 100Mbps router, and the back panel even features a second set of VGA and PS/2 ports so that the box can act as a KVM switch. (You switch channels with a front panel button.) If you think about it, this is a very smart feature for users wanting to separate their productivity and performance apps onto separate machines without incurring the space or cost of a second set of peripherals.

Under the hood, the V5 sports a 733MHz VIA Eden CPU with a CLE266 chipset, 256MB of DDR266 memory, a 30GB hard drive, and preloaded Windows XP Home. I plugged an Acer PCMCIA-based DVD drive into the V5's PC Card slot, connected a 2.1 speaker set to the headphone jack, and watched "The Matrix" with fabulous audio fidelity and no discernable frame drops. There are also four USB 2.0 ports (one in the front), and the power supply is external. The 2.2-pound V5 runs at a mere 12W to 14W and is so incredibly quiet that I thought it was fanless until I accidentally felt air blowing from its top vent.

Criticisms? I wish the V5 had a FireWire port for running external storage drives. My test unit also failed to run a Logitech MX500 optical mouse and Mitsumi's tiny Sushi Mouse when connected via USB, although both worked fine when I applied a USB-to-PS/2 adapter. The unit can also lag a bit when starting or switching apps while multitasking. But that's it. I don't mind the loss of an optical drive because you can either add an external unit or run discs across the network.

My wife awarded the V5 a perfect score of 5 CPUs for "cuteness," something that shouldn't be underestimated when matching your environment with your next SFF box. In all ways, this is a very smartly designed product that surprises with its respectable performance, feature set, flexibility, and overall value. ▲

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

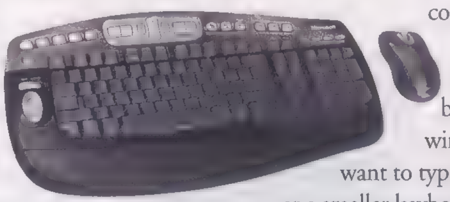
Microsoft Wireless Optical Desktop Elite

Wireless Optical Desktop Elite
$104.95
Microsoft
(800) 426-9400
(425) 882-8080
www.microsoft.com

Microsoft's latest Wireless Optical Desktop keyboard/mouse combo can't boast the Bluetooth version's long range, but it does have several new aesthetic and functional features. Instead of cramming new components into an already tight keyboard layout, Microsoft expanded the board's surface area, making it one of the largest QWERTY keyboards I've reviewed.

The Wireless Optical Desktop Elite includes an RF receiver (which has a 6-foot range), a Wireless Desktop Elite keyboard, and a Wireless IntelliMouse Explorer 2.0. The receiver has a PS/2 connector for your keyboard PS/2 port, a USB connector, and a USB-to-PS/2 adapter. I don't like the NUM, CAP, and Function LEDs across the front of the receiver because I'll need to keep the receiver in sight to see the LEDs. A keyboard this big shouldn't push standard features onto other devices.

Two programmable buttons along the side of the mouse let you activate certain commands (Forward and Backward for Explorer and Internet Explorer by default) with your thumb. The mouse's scroll wheel now tilts left and right to scroll across Web sites horizontally. Microsoft likes its TWT (Tilt Wheel Technology) so much it put another TWT scroll wheel on the keyboard. Thanks to the keyboard scroll wheel and nearby Back and Forward buttons, you can perform most mouse functions from the keyboard. When you program your mouse buttons, the settings will take to both scroll wheels. If you don't like the TWT feature, you can disable it.



The board has smoky, transparent keys; Function keys that double as shortcut keys; and a row of large, chrome shortcut and multimedia buttons. I like the new My Favorites buttons, which have numbers instead of icons that designate specific apps. You can configure a My Favorites button's shortcut by opening a Web page and pressing the button for a few seconds, or you can press the Show Favorites button and assign shortcuts the old-fashioned way.

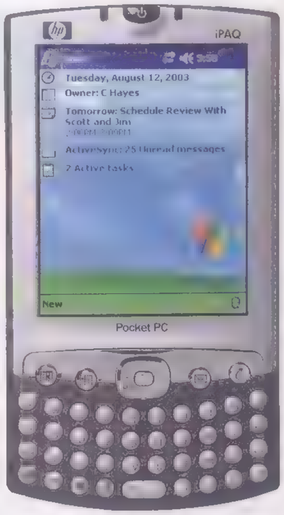
I don't like the board's built-in wrist rest; it makes the keyboard too big to sit comfortably on your lap. If you plan to keep the keyboard on the desk and buy the combo to remove wires, you'll enjoy it. If you want to type from the couch, consider a smaller keyboard with better range. ▲

by Joshua Gulick

HP iPAQ Pocket PC h4350

iPAQ Pocket PC h4350
$499
HP
(800) 752-0900
(650) 857-1501
www.hp.com

The h4350 adds a keyboard to the h4150's slim body. HP took advantage of the extra space on the back and sides of the PDA by installing a larger removable, rechargeable battery and by putting the IR port above the Record button instead of at the bottom of the device, but the two PDAs are otherwise identical.


hp
iPAQ
Tuesday, August 12, 2003
Owner: C Hayes
Tomorrow: Schedule Review With Scott and Jim
ActiveSync: 25 Unread messages
2 Active tasks
New
Pocket PC

A blue backlight illuminates the entire QWERTY keyboard, including a Start key at the bottom of the keyboard that sports a Windows icon. (It opens the Start menu in Microsoft Windows Mobile 2003.) The backlight is very bright, so you won't have any trouble finding the keys in the dark. The keys are tiny but far enough apart that you probably won't accidentally press more than one key at once, even with thick fingers. The keyboard doesn't include arrow keys or a number pad, but a blue button acts as a function key, turning the other keys into number keys, arrow keys, and special character keys. The keyboard sits just below four PIM buttons and two rectangular directional buttons.

At 5.4 inches high x 2.9 inches wide x 0.6 inches deep and 5.8 ounces, the HP iPAQ Pocket PC 4350 is much larger and heavier than its keyboardless sibling. Unfortunately, the h4350 has a 3.5-inch screen. I like the transreflective TFT display's clear images and bright backlight, but I'd take a cramped keyboard to make room for a 3.8-inch screen any day.

The PDA has several excellent components: a 400MHz Intel XScale PXA255 processor, 64MB of RAM (55MB free), and about 2.8MB of iPAQ File Store, which is protected memory that can weather hard resets. Like the h4150, the h4350 has integrated Bluetooth and 802.11b capability, making a handy traveling companion.

I like the h4350's software package, which includes Audible, iPAQ iTask Manager, and RealOne Player, among others. HP put most of the iPAQ applications in the ROM, but you'll need to install third-party apps from the CD. The h4350 is a solid PDA, but I wish it had a larger screen. I don't think the keyboard alone makes up for the large body. ▲

by Joshua Gulick

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

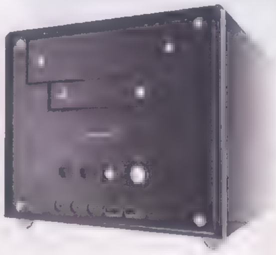
FIC ICE-Cube IC-VL67 vs. Shuttle SB65G2

In a battle where benchmark scores came in at a high-speed photo finish, we have to look beyond performance at the new Springdale-based SFF machines from FIC and Shuttle. Both are fast, sexy, versatile, and stable. But on the strength of its interior layout and wireless integration, I have to give the nod in this go-round to Shuttle.

Shuttle SB65G2

If you've followed the G2 line of XPCs, you already know this unit's exterior layout. Up front, you get the three standard audio minijacks, two USB ports, and a four-wire FireWire port. In back, tack on another four USB ports, 10/100 LAN, six-wire FireWire, one 9-pin serial, optical SPDIF in and out in the top-right corner, and a new antenna mount for the integrated 802.11b adapter. While it's amazing that we've gone this long without pre-enabled Wi-Fi SFFs, hats off to Shuttle for being the first to implement this feature, which will be a retrofit option available for models going all the way back to the 51s.

SB65G2
$359 (MSRP)
Shuttle
(626) 820-9000
www.shuttle.com



Shuttle is also targeting a massive interior revamp for the XPC line starting in Q1 of 2004. Given the new pressure from Biostar, I'm relieved to hear this. The SB65G2, while solidly built and very stable over prolonged burn-in, needs help with cable management. Although I've never encountered a thermal problem in an XPC, I'd feel more comfortable if the IDE cable draping off the back of the optical drive wasn't nearly kissing the blower fan's grille. The new XPC design is also supposed to deliver a barely audible sub-30dB noise output, well below the already quiet 35dB kicked up by the SB65G2.

Courtesy of the Intel 865PE chipset, the SB65G2 offers two SATA ports, although there is no provision for RAID. If the drive cage would have supported four rather than three drives, I'd make a bigger stink about this. As it is, I'm just happy to see the 220W PSU now sporting a SATA power connector.

The SB65G2 is another in a long string of outstanding XPCs suitable to any environment.

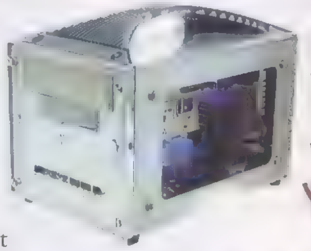
FIC IC-VL67

The Cube is a hot looker with no need for fancy carrying cases or other add-ons. A closer examination does reveal some updates, though. The top panel is now hinged at the back, so you only need to loosen the front two screws and lift for easy access to the three-device drive cage. Recessed within that thick acrylic front panel are the expected six-wire 1394a port, two USB ports, optical SPDIF in, mic, and line out, but there are also the analog minijacks for rear out and center/bass, a worthy addition I haven't seen on other SFF boxes. The back panel supplies two more USB ports, two more six-wire 1394a ports, 10/100 LAN, another set of audio jacks (sans rear and center/bass), one 9-pin serial port, and VGA.

The VGA feature is worth noting. In our Springdale ATX board roundup, we observed that the 865G chipset took a slight performance hit vs. the graphics-free 865PE. FIC has closed that gap and delivered a graphics-enabled barebones box at a noticeably lower price, although there is the lack of Wi-Fi to consider. FIC provides two dual-channel DIMM sockets, one AGP, and one PCI slot. The only glaring omission from the Cube is Serial ATA.

FIC seems to be less worried than Shuttle about low noise. There are four fans in this box, and while the Cube isn't exactly noisy once you reattach the panels, Shuttle has the quiet edge. I really do like the blue LEDs in the Cube's translucent heatsink fan. It's just a shame that this glowing eye candy is mostly obscured by the bottom of the drive cage resting less than an inch above it. At first, I worried this would cause thermal problems, but the long blower fan below the power supply draws sufficient air to keep things adequately cool.

If you want a portable PC able to pump music into any theater environment, the IC-VL67 is a shoo-in, thanks to its well-planned ports and integrated graphics. And this is a fast gaming and multimedia platform to build on while you're saving for that AGP dream card. I could more easily forgive some of the unit's internal quirks if it had Shuttle's SATA and 802.11b features. Still, the ICE-Cube remains a clever design with an increasing number of elements in its favor. If FIC can hold onto its performance numbers and deliver a bit more integration near the same price point, the bigger SFF vendors will have cause to worry. ▲



ICE-Cube IC-VL67
$289.99 (MSRP)
FIC
(510) 252-7777
www.fica.com

by William Van Winkle

		3DMark		Quake III		Unreal Tournament 2003		Comanche 4	PCMark 2002	WinAce
Vendor	Model	2001 SE 640 x 480 x 16	2003 1,024 x 76 x 32	640 x 480 Normal	1,024 x 768 Normal	Flyby 1,024 x 768 x 32	Botmatch 1,024 x 768 x 32	1,024 x 768 x 32	CPU:Memory	200MB folder
FIC	ICE-Cube IC-VL67	19818	5789	365.1	357.1	221.706	78.65	62.1	7455:8931	2:50
Shuttle	SB65G2	19986	5789	369.9	356.7	221.907	78.872	62.25	7401:8977	2:49

Test platform: Intel 3.0GHz P4C processor, 1GB of Kingston HyperX PC4000, ATI ALL-IN-WONDER 9800 PRO, Windows XP Pro SP1, DirectX 9.0b.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

We suggest you start being good.
Very very good.
Gateway

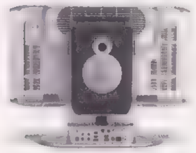
The perfect thing for those who have been very very good. Everything.

Do it all at once — the first all-in-one Media Center system that combines your PC, TV, DVD, VCR and stereo and features the Intel® Pentium® 4 Processor with HT Technology.[2]

New!

Gateway recommends Microsoft® Windows® XP

Fits anywhere – thin as an LCD



Room rattling sound with Integrated Subwoofer

Starting at $1499.99

Gateway® 610 Media Center

The ultimate home entertainment system.

The ultimate system includes an Intel® Pentium® 4 Processor with HT Technology[2] so you can run multiple applications at one time. It also has the latest hardware and software such as Microsoft® Windows® XP Media Center Edition 2004.

My TV lets you watch what you want when you want—even copy shows to DVD from your remote (610XL only).

My Music is like having a 1500 CD changer with built-in Napster service and FM radio.

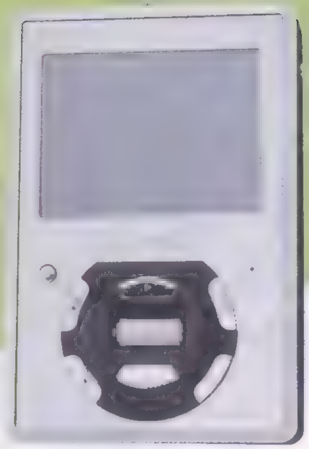
My Video stores your home movies and digital videos so you can watch them anytime. DVD player included.

My Pictures lets you catalog all your photos, eliminate the red-eye, brighten up your pics and create slide shows with music.

Napster is back! Get 1 FREE month Napster Premium only from Gateway![1]

intel inside pentium 4

A few stocking stuffers for your home computer.



$^{\$}199^{99}$

Gateway® DMP-X20
Jukebox Player

It does everything!

MP3 player, voice recorder, data storage and FM tuner!

$^{\$}199^{99}$

Gateway™ DV-S20
Pocket Multi-Cam

Double the camera.

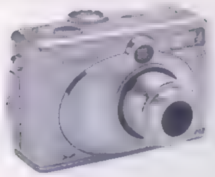
Throw your video tapes away. Digital camcorder and camera in one!

$^{\$}349^{99}$

Gateway™ DC-T50
Compact Digital Camera

Compact. Elegant. Capable.

It packs 5 megapixels and a 3X optical zoom in one, tiny package. Includes rechargeable battery and AC adapter.



$^{\$}249^{99}$

Gateway DC-M42
Digital Camera

High quality, small design.

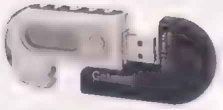
The hot new Gateway DC-M42 packs 4.1 megapixels and 3X optical zoom into an easy-to-use elegant package. Also features movie mode.

$^{\$}129^{99}$

Gateway DC-T23
Digital Camera

Pocket-sized 3-in-1.

The Gateway DC-T23 gives you 2 megapixels (perfect for emailing friends) and a 4X optical zoom. It also lets you produce great quality 4" x 6" prints.



$^{\$}99^{99}$

Gateway® DMP-200
128MB MP3 Player

Stylishly simple.

MP3 player, voice recorder and data storage all-in-one.

$^{\$}349^{99}$

Gateway™ AR-230
DVD Recorder

DVD that works like a VCR.

Record up to 6 hours on a 4.7GB DVD+R or DVD+RW disc. Features progressive-scan DVD playback, multichannel Dolby Digital and one-touch recording.

~~$^{\$}249^{99}$~~

NOW $^{\$}199^{99}$

Gateway™
Connected DVD

Progressive scan DVD.

Displays pictures and plays music/video from your PC with wired or wireless network connection.

All offers subject to change without notice or obligation and may not be available through all sales channels. Prices exclude shipping and handling. Applicable taxes extra.

Bring the games home for the holidays.

Includes best-selling games worth $130:
- Madden NFL 2004
- Battlefield 1942
- Command & Conquer: Generals

$1149.99

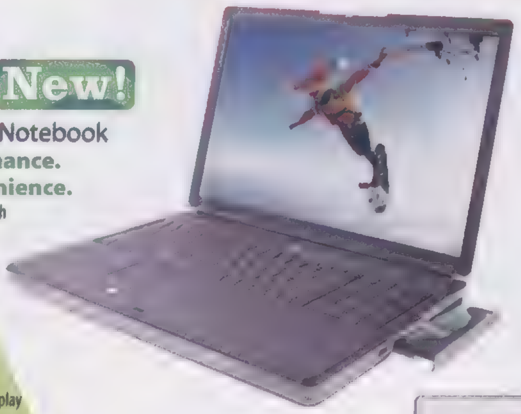
Gateway® 510G Gaming PC

Gateway recommends Microsoft® Windows® XP

Play games and burn music at the same time!

The Gateway® 510G comes with best-selling games worth $130 and incredible graphics from nVIDIA's DirectX 9 compatible GeForce 5200G graphics processor. Plus, this powerful PC comes with all the hardware you need to get the most out of the newest games including 512MB DDR SDRAM, THX-approved Sound Blaster® Audigy 2, an 80GB Hard Drive[1] and a DVD-ROM/CD-RW drive. It even has an Intel® Pentium® 4 Processor with HT Technology[2] at 2.60 GHz that makes it easy to multi-task so you can burn CDs, play games and even work (if you want to) all at the same time!

Power-packed notebooks put multimedia performance into one tiny package.

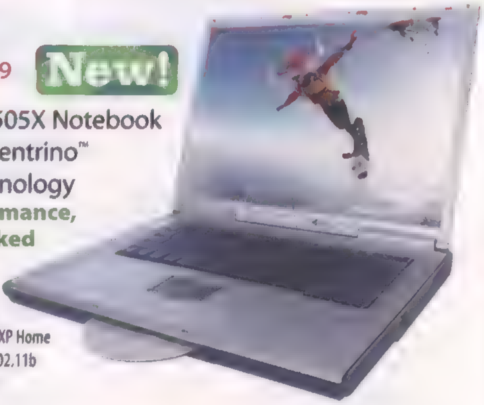


$1999.99 **New!**

Gateway M675X Notebook

Desktop performance. Notebook convenience.

- Intel® Pentium® 4 Processor with HT Technology[2] at 3.0GHz
- Microsoft® Windows® XP Home Edition
- Integrated Wireless 802.11G
- 512 MB DDR SDRAM
- 60GB Hard Drive[1]
- DVD player/CD burner
- Amazing 17.1" wide screen display



$1599.99 **New!**

Gateway M505X Notebook with Intel® Centrino™ mobile technology

High-performance, feature-packed notebook.

- Intel® Pentium® M Processor - 1.40GHz
- Microsoft® Windows® XP Home
- Integrated Wireless 802.11b
- 512 MB DDR SDRAM
- 40GB Hard Drive[1]
- Slot-load DVD player/CD burner
- Brilliant 15.4" wide screen – perfect for movies on the go
- Audio DJ – enjoy your music even when your notebook is off
- 4-hour battery life[4]
- Loaded with the latest graphics technology for gaming buffs
- Powerful sound system with integrated subwoofer

50 new products. 3 ways to Gateway.

1-800-846-4885 gateway.com Gateway® stores

Gateway

AOL Keyword: Gateway

All offers subject to change without notice or obligation and may not be available through all sales channels. All other prices exclude shipping and handling charges unless otherwise noted. Applicable taxes extra. Not responsible for typographical errors. [1]Hard drive accessible capacity varies; GB=1 Billion bytes. [2]Performance may vary depending on system configuration and software applications used. [3]No credit card required to activate 30-day promotional offer. The trial offer includes unlimited streaming and downloading and begins from the date of sign up. A credit card IS required to continue service beyond the 30-day trial period OR TO PURCHASE ANY TRACKS OR ALBUMS DURING THE TRIAL. For details please go to www.gateway.com/napster. [4]Battery life will vary depending on actual use factors. Copyright ©2003 Gateway, Inc. Terms and Conditions of Sale apply. Gateway.com and Gateway Country Stores, LLC are separate legal entities. Intel, Intel Inside, the Intel Inside logo, Pentium, Celeron and Centrino are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Microsoft and Windows are registered trademarks of Microsoft Corporation. Ad Code: 113901

by Anand Lal Shimpi

And The Winner Is… The Radeon 9700 Pro?

I'm reminded of the fall of 2000; everyone was expecting NVIDIA to unveil its GeForce3, the long awaited successor to the cult-classic GeForce2 (yes, we have become as passionate about our GPUs as movies it seems), but instead we got a clock-speed bumped card known as the GeForce2 Ultra. I remember chastising NVIDIA for the move when I wrote the GeForce2 Ultra review way back when, but as times change and practices become more accepted, it's funny to note the number of times when a disappointing refresh has hit the streets and the very few times companies are ever called out for releasing the product.

> **What once was a hefty $400 investment has now become a mainstream card on the higher end of the pricing scale. The Radeon 9700 Pro performs very close to the new Radeon 9800 series of replacements yet can be had for not much more than a Radeon 9600 XT.**

Case in point would be ATI with the Radeon 9600 XT and 9800 XT; the two "new" products are little more than the previous generation cards with thermal diodes and negligible clock speed bumps, and they are destined to be your holiday upgrades for 2003. Although the Radeon 9600 XT and 9800 XT are both healthy competitors, they aren't the cards you should be buying.

If the decision were to come down to the Radeon 9600 XT, I'd suggest going for the Radeon 9600 Pro, a cheaper alternative that performs almost identically to the XT (you simply don't get the bragging rights of saying you have an XT). NVIDIA's GeForce FX 5700 Ultra is also a healthy competitor of the Radeon 9600 XT if you want a bit more performance, but honestly in this segment the best option is a card that's over one year old, and that's the Radeon 9700 Pro.

What once was a hefty $400 investment has now become a mainstream card on the higher end of the pricing scale. The Radeon 9700 Pro performs very close to the new Radeon 9800 series of replacements yet can be had for not much more than a Radeon 9600 XT. The performance difference between the old Radeon 9700 Pro and the 9600 XT or the 5700 Ultra is definitely noticeable, and in my opinion, worth the extra cost.

Since the feature set of the Radeon 9700 Pro is nowhere near obsolete, you won't have to worry about your card playing the next generation of games slowly at all. A $250 Radeon 9700 Pro bought today will make sure that you'll be able to play all of today's games just fine. Once Half-Life 2 and Doom III roll around, you'll enjoy competitive performance under those titles as well.

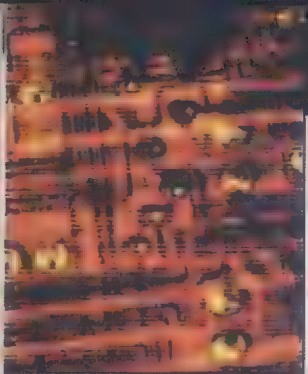
I would strongly recommend this route if you plan on upgrading this year (even if you do have a good-sized budget) because instead of spending $500 on a Radeon 9800 XT today, you could save the difference and upgrade to an R4xx- or NV4x-based GPU in the middle of next year. Depending on when games truly begin stressing the hardware, you may be able to last until next fall before you really have to upgrade . . . although I understand exactly how difficult the upgrade bug is to fight off once it hits you.

With the best overall gaming CPU of 2003 being the Athlon 64, it's kind of ironic that the best overall graphics card would end up being something that's over a year old. Kudos to ATI for a job well done on the Radeon 9700 Pro, and although they will most definitely sell a decent number of their new XT line, you'll be a bit wiser and get something that's higher performing, albeit a bit older. Thankfully, model year doesn't matter as much with computer hardware. ■

Send your feedback to Anand@cpumag.com.

Holiday Wish List

1. Ferrari Enzo
2. Samsung 61-inch DLP TV
3. A PowerMac G5 to benchmark against the Athlon 64
4. Dual Apple 23-inch Cinema Displays
5. Turtle Beach AudioTron 100
6. Canon Digital Rebel
7. Lexar 2GB CompactFlash Card (to go with the Digital Rebel of course)
8. Blackberry 7210 (I'm addicted, and this one's in color)
9. ATI FireGL X2-256 (basically a Radeon 9800 256MB with dual DVI)
10. Dual Opteron 2.0GHz on MSI's K8T Master2 FAR



by Alex "Sharky" Ross

Requiem For A Cheat Part 2

So what should we do when software arrives and one company's implementation is pretty and fast and another's is just pretty? First, Sparky, take a deep breath and get some perspective. This isn't a new story. Hardware architectures have been battling over performance crowns for decades, and I bet shady optimizations weren't invented last week.

Testing hardware used to be pretty simple. If you did a few runs of Quake II Timedemo1 and tried playing a handful of games and they looked and played about how you expected them to only a bit better, that was a good graphics card. The hardest thing was usually getting beta drivers to actually work on engineering samples. Now you need spectrum analyzers and oscilloscopes and decompilers and tarot cards to figure out what is really going on inside the hardware, and most of us are gravely short on tarot cards. This is kind of funny when you think about it because every gamer who buys a board goes home and tests it quite easily.

Don't jump to conclusions.

With the HL2 benchmarks and then Valve's source code leak, Gabe Newell's main message seems to have been obscured by all the noise. Contrary to a popular misconception, his clearly stated goal was not about dissing NVIDIA for current DX9 performance. He was beseeching hardware manufacturers (all of them) to stop tweaking for specific benchmarks and focus those resources back on good optimizations that benefit actual game performance. When he said, "Our customers will be pissed," he wasn't talking about NVIDIA's level of performance per se; he was talking about the decorrelation between engineered benchmark results and real-world performance. Whatever HL2 performance is like on NVIDIA hardware when the game finally ships, if tweaked benchmarks showed much higher frame rates than players could get in the game, even NVIDIA's customers would be pissed.

Not famous for grace under fire even when they were on top, NVIDIA representatives tended to get downright stroppy when presented with an unpleasant truth that was likely to impact a bottom line or even a bottom or two. But the current noisy situation could become a real opportunity for NVIDIA management to encourage a long-term view toward rebuilding NVIDIA's reputation and credibility, while at the same time pulling the whole industry toward better practices regarding shady optimizations.

In recent *CPU* interviews (www.cpumag.com/cpudec03/shaderinterviews), NVIDIA chief scientist, David Kirk, outlined a new policy for ensuring that only valid optimizations are implemented in NVIDIA drivers. That policy was formally announced and elaborated on at a recent editor's day event in San Francisco attended by top NVIDIA technology brass and CEO Jen-Hsun Huang, several game developers, and a hotel ballroom full of international journalists. Henceforth (apparently), NVIDIA will officially stop cheating on benchmarks. Driver optimizations will now adhere to a set of strict guidelines wherein optimizations must produce the correct image, they must accelerate more than just a benchmark, and they must not contain precomputed state information such as knowing where the camera is for a particular application and specifically chopping out the unseen bits that would normally be part of that rendering process.

I suppose the next logical question is: Should we believe? My answer: No, not blindly. Keep the pressure on. Let them know we are going to be watching. Poke ATI and others to follow suit with its own declaration, or at least to reveal what its criteria is for approving optimizations.

In the meantime, don't jump to any conclusions about what performance will be like with final game code and optimized drivers. This is a good time to remember to wait until the game you want to play with all features turned on is on store shelves before you buy a card to support it.

Although benchmark cheating may be in the eye of the beholder, the beholder that should matter most is the developer who created the benchmarked content. They know what they coded in, they know what it should look like, and they darn well know when they are being fiddled with. When Half-Life 2 and other DX9 games are released, the performance will be in the pudding, along with a lot of other things. ■

Don't bother sending me any 3D optimizations at sharky@cpumag.com.

Holiday Wish List

1. *True wireless connectivity*
2. *Half-Life 2 and Doom III*
3. *HUD in-car Web browser*
4. *For graphics chip companies to close marketing departments down*
5. *Stop driver cheats*
6. *Motec*
7. *NV40 or R400 to have 32 pipes*
8. *A video card with 1GB of DDR2 memory*
9. *A 4GHz Prescott*
10. *A new haircut and bio picture*

by Kyle Bennett

The Smoke Clears

Holiday Wish List

1. *For CPU to pay me another year for running my mouth*
2. *Prescott by Christmas!*
3. *Mainboard DDR2 support*
4. *8-pipe mainstream Radeon*
5. *Half-Life 2*
6. *To finish Vice City*
7. *A real DX9 NVIDIA video card*
8. *Half-Life 2*
9. *$200 AMD64 CPUs*
10. *A non-Phantom console*

I've just returned from Computex '03 in Taipei, Taiwan. It's arguably the biggest real hardware show in the world. I've been to the other two shows that claim to be bigger, but they have less hardware and more fluff. For the most part, attending Computex gives you an eagle-eyed view of what's about to come forth in the industry. There weren't big secrets being held out on as is usual, but there were a couple of things that were surprising for sure.

The shining stars of the Computex show were AMD and VIA. AMD, of course, has now launched its new line of Athlon 64 CPUs, and the performance looks to be an Intel-crushing blow—if AMD can get supply and pricing in line in the coming months. VIA's K8T800 mainboard chipset was about the only Athlon 64 chipset prominently on display on the Computex show floor. The Taiwanese mainboard builders seem to be leaning toward VIA due to stability, compatibility, and pricing. A few NVIDIA nForce3 chipset boards were found, but support seemed to be limited.

Intel and its chipsets were out in force, as well, and are selling at a much brisker pace than AMD products, according to board builders. Prescott, Intel's next CPU, is on the horizon and will kick off in the coming months. While you could catch a look at the CPU and a few chipsets that will support it, no boards hung on any walls at Computex.

> Rumors have been rampant about several big NVIDIA-only card builders leaving the flock in search of more profitable and better-performing video cards. . . .

Rumors have been rampant about several big NVIDIA-only card builders leaving the flock in search of more profitable and better-performing video cards, but it was apparent from listening to the who's who at Computex that this was a done deal. ASUS, which should have officially launched product by the time you read this, will be selling retail ATI-based video cards. Following ASUS, we'll likely see MSI. I'm not sure which companies will follow, but ASUS and MSI are breaking the dike and allowing for what will be a flood of others for sure.

NVIDIA has controlled its add-in card partners with a fierce death grip for a solid couple of years now. Gone are the days of worrying about not getting chip allocation, at least when everyone else is. The benchmarking and driver scandals this last year have finally caught up with NVIDIA, as well. Recently, 90% of our readers polled voted that their next video cards would be from ATI. Combine these factors with NVIDIA's flagship GeForce FX series of cards looking to possibly be very lacking in the upcoming DX9 gaming arena and you have what adds up to be once-loyal customers and card builders fleeing a sinking ship. We can only hope ATI will learn from NVIDIA's mistakes (and 3dfx's for that matter).

Still on the video-chipset front, we saw some new guys enter the picture. Well, sort of new. A company named XGI Technology, which is the bastard child of a merger between Trident (yes, it is still in business) and SiS of Taiwan, has tipped its hat into the 3D gaming arena with a chipset called the Volari. If you're thinking there's no way in hell SiS and Trident can build a video chipset to keep up with the likes of ATI, even at the mainstream level, you would be correct, and XGI knows this, as well. That's why it's taking the 3dfx approach of using more than one chipset per card.

Volari Duo is almost upon us. We saw the VD solution running in real-time in a hotel suite in Taipei. It's a real product that was turning in some good benchmarks. While I didn't have a lot of time to analyze it, the card didn't seem to be rendering the entire scene correctly. XGI explained that this first chipset is its technology from the ground up, in terms of 3D. In terms of my experience, the last couple of video chipsets that SiS has designed have been late to market, overpriced, and plagued with bugs. Let's hope the same problems don't befall XGI, but I'm not betting the farm on it. ■

Talk with Kyle at kyle@cpumag.com.

Optimizing For Hardware In DirectX 9 Titles

Who's Zooming Who?

Now that NVIDIA and ATI have released their high-end holiday offerings (the GeForce FX 5950 Ultra, page 26, and Radeon 9800 XT, page 25, respectively) and we've seen that both are very nicely reworked versions of existing chips rather than actual rip-roaring new technology, we thought it might be useful to explore another variable that affects hardware purchase decisions: the different paths each company took in implementing DirectX 9 features on their respective hardware and how optimizing for those differences is affecting game development and your post-holiday gaming experience. Of special interest is the impact of the spectacular-looking and resource-hogging bundle of features known as programmable pixel shader version 2.0, or PS2.0 for short.

DirectX evolved as a software library and device interface to enable developers to focus more on what they want their games to do rather than how to talk to every individual piece of hardware their game will encounter. As programmable GPUs have emerged with differing approaches to DirectX, game coders once again need to become more aware of the differences in hardware and make choices and tradeoffs for functionality and performance.

DX9 Hardware

There are several places where optimizations can take place along the pipeline that begins with a developer's source code and ends up as pixels on your screen. Most of them are governed by complex, interdependent technical decisions that were made months or even years before by engineers with something less than the full picture available, and the fallout from those decisions can stay with us for years to come.

ATI's stated design goals for the R3xx chips were based on running advanced DX9 features without a speed penalty over DX8 code. They therefore chose to follow the DX9 spec of 24-bit floating point (FP24) for pixel shader precision and the limit of 64 instructions for each pixel shader program. This limit was largely mitigated by the introduction of the fragment stream FIFO, or "F" buffer technology, in the R350 chip that enables execution of pixel shader programs of arbitrary instruction length. ATI did add some advanced features such as multiple render targets and floating point textures, so not everything is standard DX9. ATI also chose to stay with the proven 0.15-micron process for its fully featured high-end products.

NVIDIA took a different approach by offering higher specs to customers than the basic DX9 package, allocating resources for up to 1,024 instructions per pixel shader program and offering the higher standard of 32-bit floating-point (FP32) precision for pixel processing. As 32 bits of precision is more taxing than 24 bits, NVIDIA's workaround optimization is to drop down to 16-bit "partial" precision when 32 bits are not needed. An unfortunate aspect of this option is the extra work required for the developer to create this alternate code path, but NVIDIA has implemented some automated precision optimization into its shader-optimizing runtime compiler incorporated into new drivers. This optimization should only make changes to the executed code where the lower precision would not affect the final answer in the math calculations.

Another significant difference between NVIDIA and ATI hardware is the way that pixels are processed. While ATI has presented block diagrams of its eight-pixel pipeline architecture processing one pixel per clock per pipeline, until recently, NVIDIA had offered less specific information on its architecture, stating that the number of pipes are not as important as processing power and that its architecture is programmable, not fixed. For features such as z-rendering, stencil operations, texture operations, and shader operations, NVIDIA lists eight pixels per clock, while older style color+ z-rendering games such as Quake III process at four pixels per clock. NVIDIA's majority stake in DX9 desktop product sales masks the significant impact of being very late to the mass-market DX9 party, at least partly due to

Gearbox Software's Halo Combat Evolved began on ATI, then moved to an NVIDIA development platform. It features optimizations from both companies and uses PS2.0 extensively.

the decision to launch on a difficult and untried 0.13-micron process.

Application Development

One bit of fallout from NVIDIA's DX9 products arriving many months after ATI's has been that many DX9 developers chose ATI products for their development platform and thus became more familiar with ATI's optimal code path. ATI has significantly ramped up its developer support team to respond to that increased demand. An area where NVIDIA hardware may be ahead with developers is in teams using NVIDIA plug-ins for content creation software. This brings its own mixed blessing, as artists, never known for their restraint when creating artwork, are now able to design their own shaders. As even a few dozen lines of HLSL (high level shading language) or Cg can generate hundreds of lines of assembly, it's not hard to imagine the old artist/programmer battles have ratcheted up a notch or two over programmable shaders.

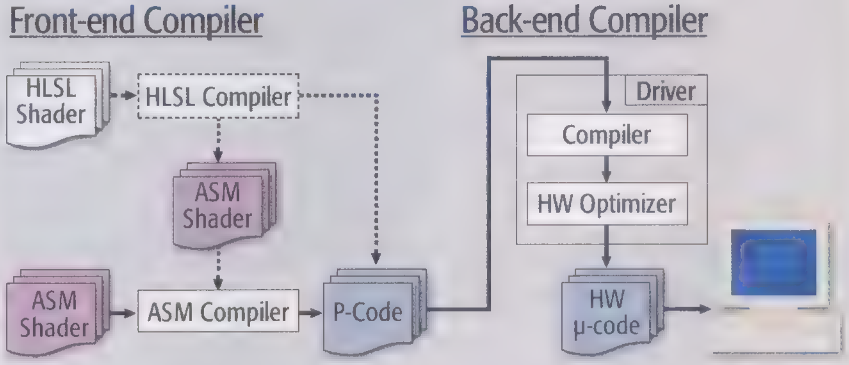
Optimizing software applications for the wide variety of hardware they will likely run on has always been part of the development process, usually the last part. Early on, the technical director will have made some crucial decisions about the target "sweet spot" API and hardware platform, as well as the minimum system requirements. They will also choose a development platform, which will tend to have a performance advantage, at least during development. Once code development is close to completion, testing on all target platforms takes over, and that is where a lot of the real optimization takes place.

Though developer relations engineers at ATI or NVIDIA can be called in to assist with optimization at any time in the process, if fewer teams are actively developing on NVIDIA hardware, ATI could be reaping an additional benefit by receiving early feedback and bug reports that come out of the normal development process, while NVIDIA may be getting the bulk of its feedback toward the end of development. This could contribute to slower implementation of optimizations

Shader Code Stages

As you can see in these images (courtesy of a shader optimization presentation from ATI), shader code goes through up to three compilation stages where it is translated from one format to another through four different types of code. Opportunities for introducing optimizations, as well as bugs, can happen at any or all stages, and which entity (game programmer, HLSL compiler, assembly compiler, DirectX API, or hardware driver) has control of optimization at each stage changes along the way. Care must be taken at all stages so that something is not lost in the translation.

Shader Compilation Process



Shader At Various Compilation Stages

HLSL code:	float x=(a*abs (f)) > (b*abs (f)) ;			
Assembly code:	abs	r7.w,	c2.x	
	mul	r2.w,	r7.w,	c0.x
	mul	r9.w,	r7.w,	c1.x
	slt	r0.w,	r9.w,	r2.w
DirectX® p-code:	02000023	80080007	a0000002	
	03000005	80080002	80ff0007	a0000000
	03000005	80080009	80ff0007	a0000001
	0300000c	d00f0000	80ff0009	80ff0002
Hardware specific µ-code:	983a28f41595			
	329d8d123c04			
	329d8d627c08			
	3b487794333a			

Both NVIDIA and ATI now recommend using Microsoft's HLSL for Direct3D applications, although NVIDIA still promotes Cg for OpenGL development. After a programmer writes a pixel shader in HLSL, it is run through the HLSL compiler that takes the high level language-based instructions and generates shader instructions in sequences of DirectX p-code (pseudo code). Each hardware vendor works closely with Microsoft to create a code-optimizing HLSL compiler that works well with its hardware. ATI recommends the "standard" compile target of generic DX9 code for its hardware, but a partial precision path was added to take advantage of NVIDIA's FP16 option.

An alternate method is for the HLSL compiler to output lines of assembly instructions. This ASM code can then be tweaked directly, if the programmer has that level of knowledge and skill, and combined with pieces of other assembly shaders, including hand-coded assembly to create new shaders, which are run through an ASM compiler to generate the p-code, which is then translated by the driver into optimized hardware-specific microcode. ▲

in NVIDIA's driver updates and a flood of them when they do come.

As publishing contracts are very specific about what hardware a game must run on with acceptable functionality, image quality, and especially performance, developers don't really have the option of releasing a game that does not run well on all of the major graphics platforms. Thus ATI and NVIDIA are not seriously concerned about a top game title shipping with bad performance on either platform, but each is vying for limited developer resources to make their respective hardware look and function at its best. Developers have always faced choices about time, resources, and tradeoffs, but the main purpose of Direct3D was to avoid having to mess with multiple code paths to support different hardware. By going outside the DX9 specs, each vendor has created an opportunity to showcase advanced features that their competition cannot.

It is generally accepted by all parties involved that optimizations to improve performance undertaken by the developer in the game code are deemed legitimate; it is their game, their choice. However, optimizations undertaken by anyone else done outside the game code should be limited to introducing hardware-specific efficiencies that do not change the rendered image from the developer's intent. But if a developer is forced to make compromises in image quality for one code path in order to achieve equivalent performance, it's almost a technicality about who made the change.

> Good coding practices in HLSL can go a long way toward creating efficient shaders, and both NVIDIA and ATI spend a lot of time and energy telling developers how best to do just that.

Valve Software's Half-Life 2 was developed primarily on ATI hardware and features high dynamic range lighting with per-pixel diffuse and specular lighting as well as soft shadows.

HLSL Compiler

Good coding practices in HLSL can go a long way toward creating efficient shaders, and both NVIDIA and ATI spend a lot of time and energy telling developers how best to do that. But they are not always emphasizing the same things, as each type of hardware has its strengths and shortcomings. ATI pixel engines can simultaneously read textures and perform ALU (arithmetic logic unit) operations, while NVIDIA's hardware is more efficient if it does two texture accesses and then two math operations.

With a variety of different chip architectures to target, each having some degree of sensitivity to changes in such things as instruction ordering, register usage, and parallel execution of instructions, programmable GPU compiler technology is still in its infancy, and hardware drivers are the place where these compilers are constantly evolving.

Hardware Drivers & Optimizing Runtime Compilers

The graphics card driver is the last chance for game code to be optimized for full performance before the hardware takes over, so if the developer has not optimized well for the hardware you are running, the team building the driver has to take up the slack. Even if the hardware driver were not making any optimizations, it must still translate p-code (pseudo code) pixel shader instructions into the microcode instructions that the GPU consumes. This microcode is proprietary and is not open to easy direct analysis.

We had discussions with both NVIDIA and ATI about what is going on under the hood of their compiler technology. You can read these interviews online at www.cpumag.com/cpudec03/shaderinterviews. In general, the compilers build a code tree and parse the DX9 pixel shader code into a directed acyclic graph that describes the execution of the program. From that graph can be drawn potential optimization opportunities, such as reordering of instructions, elimination of nonfunctional instructions, and efficiencies in precision.

User Preferences

The final optimization is actually done by you, the gamer. When you make selections either in game menus or in hardware driver panels, you are telling the hardware what you want to see and how you want to see it. By having full DX9 features supported even on mainstream hardware, just about anyone can get a front-row seat to the DX9 show. Some may be watching in full throttle high def, and others are getting the slo-mo version, but all the pixels are still there. To get your speed fix, just tweak down your resolution, anti-aliasing, or DirectX version number settings and then feel smug about saving hundreds of dollars on your graphics card. Remember, this is supposed to be fun. Happy Blasting!

by Joan Wood

Swappin' Parts

CINDI's Frosty Farewell

Each month in "Swappin' Parts," a Computer Power User *writer upgrades one out-of-date component in our test machine, CINDI (Computer In Need of Drastic Improvement). After many months—not to mention a 3GHz P4, 1GB of PC3200 DDR, a Radeon 9800 Pro, and a terabyte of SATA storage space—CINDI is about to undergo her final transformation. If you thought she was hot before, see how cool she is now.*

The nVENTIV's cooling display.

Here is the nVENTIV Mach II next to the black panels that it comes with. Options we bought include an aluminum conversion kit, orange display, and mounting kit for Intel CPUs.

We're living in a material world, and CINDI is a material girl. She's living proof of the healing power of a credit card. A year of retail therapy has done our beloved project PC no end of good. She was once a lowly, used eMachine etower 600is, tragically overpriced and languishing on a Computer Renaissance shelf. Today, she's not only a beautiful, powerful system, but also, I daresay, the coolest PC in town.

How cool is cool, you ask? How about 51 degrees below zero Celsius? It's true. CINDI's first transformation was from mousy gray box to hot nacho over a period of months. About $1,300 later, she's turned into one serious ice queen in just a couple of days. Put on your mittens, and we'll tell you how.

Whys, Wherefores & Why Nots

CINDI came into our lives in the January 2003 issue looking like a pathetic breadbox someone had covered with Barbie stickers. She walked a 600MHz Celeron in those dark days, trying to keep Windows Me happy with just 32MB of SDRAM and a 10GB hard drive. She was not a pretty sight. Not unless one was a sailor who had been at sea without any Internet for a very long time and therefore wasn't all that particular.

Over the coming months, Michael Sweet and I spent way more money than any sane person would have on an eMachine. Check out the "CINDI's Credit Card Bill" chart for a list of her sweet gear, and try not to cough over her final price.

To be honest, we could have just called CINDI complete last month. Apart from getting her teeth capped—I mean, getting a replacement floppy drive with a silver bezel—she really did not need anything more than wire-harness dressing and some rounded cables. She would have been fan-boy bait for years to come.

All this, but a few more surprises from this year's girl. I wanted to give CINDI a legacy—something to keep her not just cutting edge for a long time, but actually *beyond* cutting edge.

The Insidious One, Samit, had given me a vague directive to "do something with CINDI's cooling." Michael suggested I hit the hardware stores to cobble up a homebrew water-cooling setup for our aluminum maiden. Instead, I took a glance at one of my recent "Dream Hardware" columns and knew exactly what I wanted to give CINDI: frostbite.

The Danish company formerly known as Chip-con now goes by the name of nVENTIV (www.nventiv.com). Its Prometeia Mach II Vapor Cooler is now the nVENTIV Mach II. Put bluntly, the Mach II is a fridge that you can bolt under your PC's case. Well, actually, it's a refrigerating compressor and condenser connected to an insulated tube that ends in a copper heatsink that fits over the CPU. Large, quiet fans move air front to back through the Mach II, and an optional digital readout on the front tells you the CPU's current speed, load, and heatsink temperature. nVENTIV claims the Mach II can siphon off up to 200W of heat from a processor.

I crossed my fingers and put in an order for a Mach II ($999), an Intel CPU EasyMod Kit ($49), and an orange LCD Display Kit ($69). The Mach II's black fascia and side panels would have looked out of place under CINDI's brown and silver frame, so I also requested the optional silver Aluminum Conversion Kit ($159) for Lian Li cases. Finally, I tacked on some nylon ties, the silver floppy I mentioned, and rounded optical and floppy cables to match CINDI's red SATA cables.

They bought it. Thanks to resellers FrozenCPU.com and PCAvailable.com, CINDI was ready to undergo radical surgery. Note that nVENTIV also ships the Mach II already mounted under a tower case. This combo would have made for an easier upgrade, but nVENTIV's case didn't have enough drive bays for all of CINDI's hardware.

Metal Shop

Overall, I was very impressed with the looks, function, and fit of the Mach II kit. I wasn't crazy about the reliance on adhesives in some areas, but with proper preparation, these proved strong. I also didn't like the idea of screwing bolts into plastic and aluminum, which are easy to strip if you're not careful. Finally, a few edges had more burr than Sean Connery, but I can forgive this because of the overall precision of the fabrication.

First, I removed the Mach II's black front and side panels. The latter used both screws and double-sided tape to dampen vibrations. This meant that I had to spend some time fingernailing and acetoning off the old tape, as the aluminum conversion kit's brackets use adhesive strips to adhere to the Mach II's housing. Structurally speaking, I'm more of a screw guy than a glue guy. Screws would have been much faster, too.

Here's the basic idea: The conversion kit's aluminum brackets stick to the Mach II. The side panels screw into channels on the side brackets, and the front panel pops into place on the front brackets. To get everything to line up correctly, I had to follow the directions exactly without skipping ahead.

Adhesives require good surface preparation, so I cleaned off the Mach II's sides with acetone. A better cleaner, such as Birchwood Casey's Gun Scrubber, would probably have left even less residue behind, but acetone worked fine for me. I attached the front brackets to the Mach II and then the front panel. Next, I screwed the brackets to the side panels as instructed, and only then did I peel off the bracket adhesives' protective paper and attach the whole assemblies to the Mach II in groups. This saved me the embarrassment of sticking on the brackets one by one and then discovering they did not line up with the side panel's screw holes.

The Mach II's optional Aluminum Conversion Kit for Lian Li cases looks right at home under CINDI's Cooler Master case.

After letting the adhesives cure over lunch, I popped off the Mach II's new front panel and mounted the orange LCD readout. This optional kit comes with spacers and screws of different lengths to accommodate various front-to-back dimensions. I found the three long spacers and used screws to put the LCD perfectly up against the aluminum front panel's window. I snaked the LCD's data cable through the Mach II and attached it to the electronic module in the rear.

Next, it was time to get medieval. I gutted CINDI and set aside her components for later. I then took her empty case home to my garage. I needed to drill four holes in her bottom panel to match the predrilled and tapped boltholes on the Mach II's top. CINDI also needed a 1.5-inch, radiused channel opposite her PCI slots near her back end. This would let the insulated, semiflexible cooling tube (dubbed the "thermal bus") discreetly enter her case from below. Thankfully, nVENTIV provided a template card, which I double-checked against the holes in the Mach II. It matched very well.

I flipped CINDI upside down and unscrewed her plastic feet. I taped the template to her underside, making sure that it was centered and abutting her case's rear panel. The Mach II's mounting bolts would have 0.25-inch holes, but I chose a 5/16-inch drill bit for a little wiggle room. I marked each hole with a black Sharpie and center-punched them.

Next, I outlined the 1.5-inch channel with the marker. Using a ruler and those long-forgotten math skills, I found the center of the radiused part of the channel and center-punched it for drilling. The channel would look like an elongated U when I was done and let the thermal bus slip into it from the side, which would be invisible with CINDI's side panels attached. This obviated the need for a 3-inch hole to let the entire CPU cooling plate through. Engineering!

I pulled off the template and prepared to drill. Unfortunately, the template placed the mounting holes directly under the walls of the Cooler Master case's 3.5-inch drive bays. Had I brought the Mach II home with me, I probably would have drilled new holes in its roof in better locations and either tapped them or scrounged some nuts and lock washers. Time was short, though, so I went ahead and drilled.

Afterward, I turned CINDI right side up. Using a Dremel, I ground out some room for the bolt heads to turn in. This is a poor way to go for a number of reasons (it's hard on your Dremel, and it takes forever because aluminum seriously loads up most grinding stones), although the result wasn't visible when I installed the hard drives later.

Oh, dear. CINDI has been a bit free with her plastic. Here's a more-or-less accurate list of the damage.

CINDI's Credit Card Bill

CPU Issue	Upgrade	Cost
February	Cooler Master 201B-SXK case	$150
February	Enermax EG465P-VE FCA PSU	$95
March	Creative Labs Audigy 2 Platinum	$167
March	Logitech Z-680 5.1 speakers	$309
April	Pioneer DVR-A05U DVD-RW	$309.40
April	Plextor PlexWriter 48/24/48A CD-RW	$138.73
May	HP 20-inch L2025 LCD	$1,418.19
May	Logitech Elite keyboard	$30.95
May	Logitech MX700 wireless mouse	$65.55
May	Belkin USB 2.0 hub	$56.19
May	Thrustmaster gamepad	$29.99
May	Microsoft S SideWinder ForceFeedback joystick	$85.66
June	Pinnacle Studio 8 DV	$95
June	Hauppage WinTV PVR 350 tuner	$367.40
August	Gigabyte GA-8KNXP mainboard	$250
August	3GHz 800MHz FSB Pentium 4	$545
August	(2) 512MB Mushkin PC3200 DDR	$330
August	Windows XP Home	$93
September	FIC Radeon 9800 Pro 256MB	$499
October	(4) WD2500JD SATA 250GBs	$1,238
December	nVENTIV Mach II Vapor Cooler, cables, floppy	$1,302
Total		**$7575.06**

Once the mounting holes were deburred, I flipped CINDI over again and gave some thought to the thermal bus channel. I had a doorknob-sized hole saw bit, but it was too big for the thermal bus, yet too small for the whole cooling plate. In the end, I chose a $1 Black & Decker spade bit instead of a trip to the hardware store. As I said, time was short, and I figured carbide would win out over aluminum. It did.

I opened up the rest of the channel with an electric angle grinder (a pneumatic cutoff wheel would have worked a little better) and then dressed the edges with the poor Dremel. Fortunately, nVENTIV includes a flexible plastic-edge liner you can use to cover your hack job. Just cut the liner to fit and work it onto the edge, and all sins are forgotten.

Mobo Meddling

Back at work, I bolted CINDI's empty case to the top of the Mach II and installed her drives. Phase 2 required some motherboard preparation, such as removing its plastic heatsink support bracket. Such radical cooling could lead to condensation and a dangerous case of the drips, so the Mach II's heatsink needs an airtight seal all the way around the CPU. That's a tall order, but again, nVENTIV made it easy.

In a nutshell, the heatsink unit mount has a rear plate that goes behind the motherboard and another that fits around the CPU socket. Both are sealed with a pliable, tacky caulk called sealer string, which for artistic reasons I took to calling "silly string." This comes in a long roll, and you cut what you need to make a good, airtight perimeter. A few transistors and ICs lay where the plates would seat, so I had to squish some silly string on those, too.

I tightened the plates' bolts a little at a time, each in turn, as their plastic threads had to bear the effort of squishing all that caulk. Afterward, I mounted the motherboard to CINDI's tray and slid it into her case. The rear plate has a heating element for some thermal reason that's probably important, so I made sure to hook up its connector later.

After a trial fit of the thermal bus' heatsink, I cleaned it and the CPU's heat spreader with acetone and applied the included Arctic Alumina thermal paste to the heatsink. I tightened the spring-loaded bolts until they seated and then removed them again to verify that the paste covered the CPU, indicating good contact. Finally, I attached the heatsink once again and connected most of the Mach II's wires. CINDI's on/off switch now went to the Mach II and back to the motherboard. This lets the Mach II reach a cold temperature before starting the PC, adding a minute or two to boot-up time.

In went all of CINDI's cards and cables, and to my delight, she booted on the first try. I connected the last Mach II cable to a USB header on her mainboard and supplied the driver when WinXP asked for it. A quick install of nVENTIV's control panel software and it was time to gloat. Negative 51C, Mom!

Chilling Effect

All this cooling begs the question: How fast will CINDI go? Our intrepid lab tester, Andy Gerace, upped CINDI's FSB and core voltage to reach a stunning 4.027GHz, her stable maximum. She might have a bit more speed in her, too. The cost of the Mach II cooler hath lost its sting now that we know that almost any chip in CINDI's future will probably run a third faster than stock.

So you see, blatant consumerism really did turn our project PC around. That's our CINDI: eMachine by birth, bourgeois by choice. And to CINDI's ardent admirers, she's issuing a polite declination to any and all marriage proposals. Now that she's evolved beyond being a mere hottie, she's decided to play the field awhile. Even MERLE doesn't stand a chance.

This will be the last "Swappin' Parts" for a while. CINDI and MERLE will make way for a Q&A section by the guys at HotHardware.com. Catch their first installment next month. You can send your questions to Q&A@cpumag.com. **CPU**

by Marty Sems

CINDI's Final Benchmarks

Overclocking only the CPU's FSB and core voltage, and underclocking the RAM a little, here are CINDI's final benchmarks. Note that Windows XP was running from a single hard drive, as CINDI had issues booting from a RAID.

CINDI's Final Specs	
CPU speed	4.027GHz
FSB speed	268MHz
RAM speed	356MHz

PC Mark 2002	
CPU	9,764
Memory	9,350
Hard Drive	1,323
3DMark2001	18,570
3DMark03	5,875

FogScreen

Now You See It, Now You Walk Through It

If the local forecast calls for fog, everyone wonders how it's going to affect visibility. If the fog is thick enough, driving becomes hazardous, and shining your car's headlights on the fog doesn't help if the fog is thick because the fog reflects the light and doesn't allow it to penetrate.

However, this reflective quality of thick fog *enhances* visibility in one instance, one your weatherperson probably can't predict. The FogScreen, developed in Finland by Ismo Rakkolainen and Karri Palovuori, uses a thick layer of fog to create a makeshift projection screen, allowing a user to project images that seem to hang in the air.

Even though FogScreen is still in the early stages of development and production, those who've seen the product demonstrated at tech trade shows—such as SIGGRAPH 2003, recently held in San Diego—typically say one of two things: The technology is one of the coolest they've seen, or the technology has dozens of potential applications. You can see a video clip of the FogScreen in action at www.fogscreen.com/company.html.

FogScreen Applications

FogScreen, which was initially known as WAVE (Walk-Through Virtual Environment), was announced in December 2001. The first public demonstration of FogScreen was in Finland in October 2002. The FogScreen has appeared in the

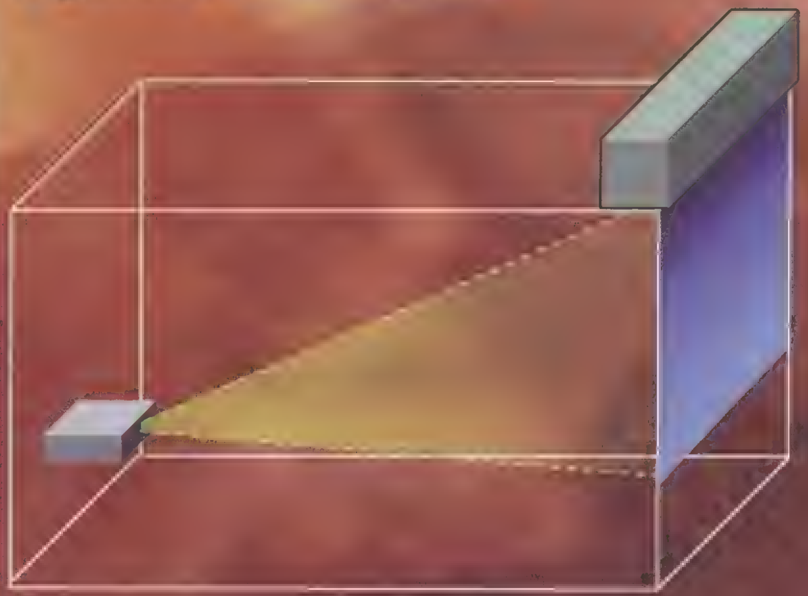
Heliodisplay Offers Competition

Just as FogScreen technology is gaining widespread attention, a similar type of technology aims to create a virtual screen, too. An MIT graduate student named Chad Dyner recently announced the Heliodisplay, an idea he says was sparked by the 3D holographic image of Princess Leia in "Star Wars."

The product creates a virtual screen in the air above the Heliodisplay video projector by creating a cloud of water vapor. The projector then displays the image on the vapor cloud. Users can manipulate the virtual image with their hands. In future versions of Heliodisplay, users will be able to project the image to the side or farther away from the projector unit.

Heliodisplay is in the early development stages. Check out page 18 of this issue and Dyner's Web site (www.io2technology.com) for more information on the possibilities for Heliodisplay. ▲

FogScreen Fundamentals



How It Works

Think about how your car's headlights reflect off thick fog or how a light beam looks when shining through thick smoke and you'll begin to understand how FogScreen works.

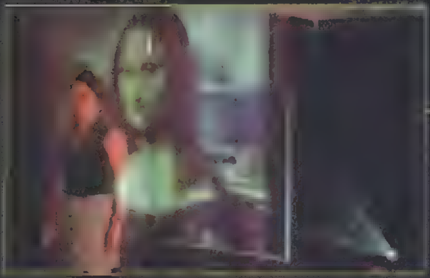
The FogScreen unit creates a stream of fog by flowing ultrasonic waves through water. The unit (green) hangs several feet above the ground over the position where you want the image to appear (blue). After the unit creates the stream of fog, a projector (gray) shines an image (it can be either a still image or a video clip) onto the FogScreen. The image can be projected from either the front or the back, but the image is brightest when the FogScreen is lit from the back.

Although developers say the stream of fog doesn't feel damp or does not noticeably raise the humidity levels in the surrounding area, users will sometimes notice a slight condensation under the FogScreen. To avoid problems with slippery floors, the developers recommend using a grate or other water container that users can walk on.

Source: FogScreen Inc.

Vapriikki Museum in Tampere, Finland, since January 2003.

The current version of the unit has dimensions of about 26 inches high x 87 inches wide x 38 inches deep and weighs about 150 pounds. It can create an image area about 60 x 78 inches. The developers of FogScreen have created a distribution and development company, FogScreen Inc., to handle marketing of the product. The company currently is manufacturing a limited number of FogScreens but hopes to begin mass production sometime in 2004. As the company begins mass-producing FogScreen units, larger and smaller units will be available. The first FogScreen units cost 95,000 euros (about $110,000 at the time of this writing), but companies can also rent the FogScreen.



The FogScreen can display either still images or video clips with equal success, making them appear to float in air.

Early indications place the FogScreen product at shops and malls, grabbing the attention of potential consumers. A consumer could be enticed to walk through the FogScreen into a special sales area, for example. The FogScreen developers say the unique nature of FogScreen will make it a memorable experience for customers.

The FogScreen is useful for unsupervised public presentations because it can pretty much run on its own. In addition, the FogScreen equipment runs almost silently, making it ideal for use in a variety of locations. The stream of fog can appear and disappear within a fraction of a second, as well, making it a possibility for use in a live theater setting to aid with special effects.

Currently, FogScreen works best indoors with a dark background that enhances the brightness of the image on the FogScreen behind the projector. FogScreen will also work outside because the projected image is usually bright enough to be visible in outdoor light (depending on the power of the projector), but a breeze will greatly disturb the stream of fog, damaging the quality of the image.

Visibility Is Clear

Although the FogScreen is an impressive technology, it still has a ways to go before you'll see it in widespread use. You could use 1,000 FogScreens to display the names of cool technologies that have never made it to market and still not exhaust the list of candidates. Finding the right price point to drive sales and the must-have usage for FogScreen will be as important to its possible success as the technology itself.

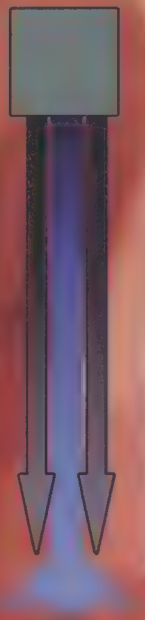
If the developers of FogScreen can overcome the inherent challenges in bringing a product to market, however, it's obvious they have an eye-grabbing technology. CPU

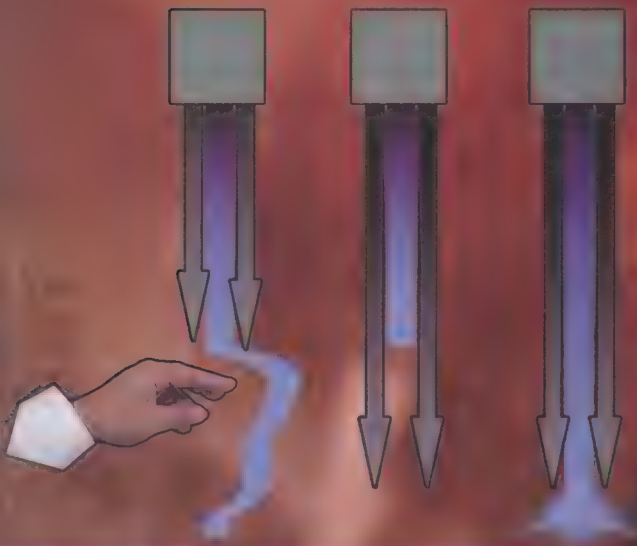
by Kyle Schurman

Air Flow

The FogScreen unit (green) creates the FogScreen by propelling a stream of fog (blue) surrounded by two flows of laminar, or nonturbulent, air (arrows). The stream of fog is 1 to 7 inches wide and resembles a downward draft of smoke. In fact, smoke or other particles similar to fog would work in the FogScreen product, but the developers of FogScreen prefer water-based fog because of its ability to dissipate into the surrounding air with no residue.

The flows of air hold the stream of fog in place and protect it from minor turbulence in the surrounding atmosphere, allowing it to reflect the light from the projector properly. The flows of air are invisible, meaning they don't hinder the FogScreen. As the laminar air flows reach about 5 feet from the unit, they lose their ability to hold the stream of fog in place, and it dissipates into the surrounding air.





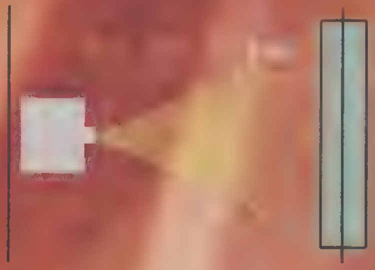
Of course, when someone walks through the FogScreen or waves a hand through it, the laminar air flows are broken, and the stream of fog responds to the movement of the atmosphere around it. However, within a split second after the person has passed through the FogScreen, the air flows return, and within another split second, the stream of fog returns, as well.

Graphics & Design: Ginger Riley & Jason Codr

The Faces Of FogScreen

Top View

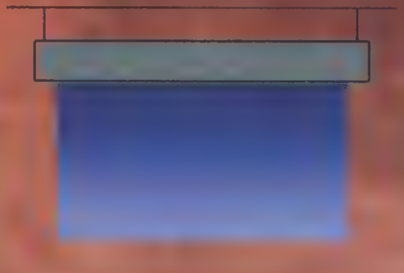
To achieve the best image results, the developers recommend using a projector (gray) with at least 3,000 ANSI lumens. And to make the image displayed by the FogScreen unit (green) as bright as possible, you should use a black curtain or other dark background material behind the projector. The projector should be at least 15 feet from the FogScreen.



Front View

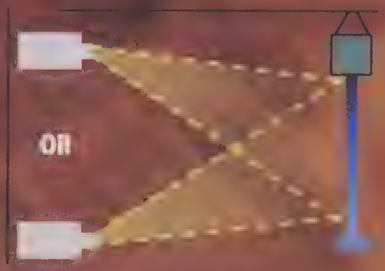
The FogScreen developers recommend hanging the FogScreen unit (green) at least 7 feet above the ground. The FogScreen (blue) then will extend from the bottom of the FogScreen unit to about 2 feet off the ground, making it the ideal height to catch someone's eye.

From the front or back, the image on the screen appears to be cascading, similar to a glass-encased waterfall, but the cascading action of the fog doesn't significantly detract from the displayed image. Images on the FogScreen look just as good from the back as from the front.



Side View

When projecting an image onto the FogScreen, the developers emphasize the need to angle the projector from either just above the FogScreen or just below it, allowing for maximum image quality. Placing the projector directly behind the FogScreen will leave the viewer looking directly into the projector's hot spot, detracting from image quality.



FogScreen In The Future

One of the most exciting aspects of the FogScreen is the large number of ideas it has sparked for future applications. If the public embraces the initial, basic FogScreen products, you can expect the developers to begin adding some of the following features and using future models in some of the following settings.

Virtual walls for gaming. We're guessing you already thought of this application. In fact, gaming is the future application many people think of first after seeing the FogScreen in action. A gaming application could create a virtual world inside a room using multiple FogScreens. The player could then walk through the FogScreen "walls," moving to different areas of the game. By constantly changing the images on the FogScreens, the gaming application could create dozens of virtual rooms within a single physical room. By adding feedback capabilities, sounds, and smells to the FogScreen's virtual environment (as we describe later), developers could truly immerse the players in the game. Obviously, similar principles could apply to virtual training environments using the FogScreen.

User feedback. At some point, users will be able to touch the FogScreen with a finger to provide feedback to a program. A tracking device would measure the location of the finger—and, perhaps, the force with which it is applied—to react to the user feedback and respond with an updated image on the FogScreen. This type of feature would be useful in gaming or in running software. Unlike a glass touch screen, a user couldn't crack, scratch, or damage the FogScreen while interacting with it.

Adding information for the senses. FogScreen appeals first to the visual senses, but developers could enhance the airflow output with data for the other senses, similar to what theme parks sometimes do with immersed rides. A sound projection device could make a FogScreen image appear as though it's speaking. Developers could add aroma to the airflow, appealing to the sense of smell. Temperature changes or humidity changes in the airflow could appeal to the sense of touch.

Virtual TV. Researchers say FogScreen could someday replace your glass TV screen or computer screen. However, this use is probably several years away. Although the image quality of the FogScreen is surprisingly good, it still has a ways to go before it could match that of a TV screen. ▲

The RIAA's Watchful Eye

How The Recording Industry Tracks You

If you've downloaded the Rufus song "Somebody's Watchin' You," you probably don't worry much about whether anyone is bothering to watch your file-swapping actions, despite the title of the song. But in light of recent events, you might want to rethink that attitude.

In early September, the RIAA sued 261 file swappers, claiming those individuals were participating in the illegal trading of copyrighted digital music files. And in mid-October, the record industry's trade group warned 204 additional people suspected of illegal file swapping that it plans to file suit against them, as well. Making unauthorized copies of copyrighted material, whether it be books, music, or movies, and then distributing those copies to others is illegal according to U.S. copyright law, regardless of whether you receive compensation for the copies.

Still, illegally swapping files, particularly the extremely popular MP3 files, over the Internet is nothing new, but it's only recently that the RIAA and large music companies have decided to sue individuals. In the past, the RIAA filed suits against those companies, such as the original Napster, that enabled P2P file sharing. Frustrated with the continuation of file swapping through other sites, though, the RIAA has upped the ante by deciding to go after individual file swappers.

If you are one of the millions of Americans who has participated in illegal file swapping, you could become an RIAA lawsuit target. The best way to avoid such a fate? Stop swapping copyrighted files. But if you're having trouble quitting cold turkey, you may be interested in lowering your risk of a lawsuit as you wean yourself and move on to legit, for-pay sites. The first thing you'll want to do is learn how the RIAA is working to stop file swapping.

Thwarting The P2P Plan

The RIAA is attacking file swapping from several angles. As it did with the original Napster, the RIAA continues to wage a legal battle against those companies and sites that provide the software and the central resources that enable P2P file sharing. The RIAA's plan worked with Napster, effectively shutting down the service. But with many P2P sites now basing themselves outside American borders, the RIAA's attempts to enforce U.S. copyright laws in other countries have proven difficult.

So the RIAA has recently taken its prosecution to the people. In its lawsuits against individual users, the RIAA has aimed at the most frequent users of the file-swapping services (at least initially). According to

Using P2P Under The Radar

In theory, the RIAA should leave you alone if you are not swapping copyrighted files, but maybe you prefer to stay under the organization's radar altogether. Unfortunately, this may be tough, as P2P services typically aren't designed to provide anonymity. The data that makes it easy to find the files you want also makes it easy for the RIAA to watch your P2P activities.

Some P2P services and options provide more anonymity than others. These options aren't completely foolproof, but you should have little to worry about as long as you keep your nose clean and don't use the network for anything illegal.

Freenet. The Freenet P2P service (freenet.sourceforge.net) really wasn't designed for music file swapping; it's a project designed to let people worldwide publish and read data anonymously, without fear of reprisal from the government. However, Freenet will work for music file swapping. It's not the user-friendly type of software you'll find at many other P2P sites, though.

Kazaa. Kazaa is currently one of the most popular P2P services, making it a likely target for the RIAA's focus, but one version of Kazaa software, Kazaa Lite (www.klitesite.com), claims to be able to block IP addresses suspected to be affiliated with the RIAA. (Kazaa Lite isn't affiliated with the Sharman Networks, which runs Kazaa and provides the original Kazaa software.)

Services under the radar. It stands to reason that the RIAA will focus its prosecution efforts on the P2P services where the most users and files exist. If you can find a small or relatively new P2P service, you might be able to avoid RIAA scrutiny. If the services provide some anonymity tools, better yet. Some smaller and newer services that fit into this category include: Blubster (www.blubster.com) and Filetopia (www.filetopia.org), which both claim their software can shield some aspects of your identity; and EarthStation 5 (www.earthstation5.com), which claims to be based in a refugee camp on the Palestinian West Bank.

Waste. This chat/IRC program also allows file sharing among small groups of people (fewer than 50). Waste's appeal lies in its high-end cryptography. Justin Frankel developed Waste while employed by Nullsoft (an AOL subsidiary), and AOL attempted to pull the software soon after it was posted. Because of this problem, Waste does not have a permanent home on the Web, but copies of it appear on various Web sites.

Wireless nodes. If you can connect to the Internet through a wireless access point that doesn't require a username or password, you can remain anonymous while using a P2P service. ▲

U.S. copyright law, the RIAA could seek damages of between $750 and $150,000 per song the defendant has pirated. The RIAA has said it will consider settlement offers from defendants and since that time has settled with many individuals. One of the first settlements in early September involved a 12-year-old girl and her mother paying the RIAA $2,000 in damages.

How Far Will They Go?

If the threat of a lawsuit isn't enough to prevent individuals from swapping copyrighted music files, music companies are hoping to frustrate downloaders with fake music files. The fake files sometimes continuously loop the refrain or play the song for about 30 seconds before replacing it with an annoying whistle. By flooding file-swapping sites with the fake files, music companies and bands hope to make those downloading the files waste so much time searching for a real file that they'll give in and purchase the CD.

The *New York Times* reported earlier this year that music companies are researching the idea of uploading viruses and other dangerous files to the file-sharing sites in an attempt to sabotage the computer of anyone who participates in file sharing. So far no one has reported an actual sabotage attempt from the music companies, and legal issues almost certainly will prevent such an action. Here are some of the more common rumors involving techniques the RIAA and music companies are researching to halt P2P file sharing, as well as an explanation of the likelihood that the RIAA would actually implement them.

Have some virus with your MP3. The RIAA would upload a doctored MP3 file containing a virus called Silence to a P2P site. When the user clicks it, Silence would search the user's computer for any MP3 files and automatically delete them.

Likelihood: no chance. If the RIAA was caught uploading viruses to individuals, the PR results would be catastrophic. Then there's the fact that the RIAA would be breaking the law to stop others from breaking the law, something the courts don't like.

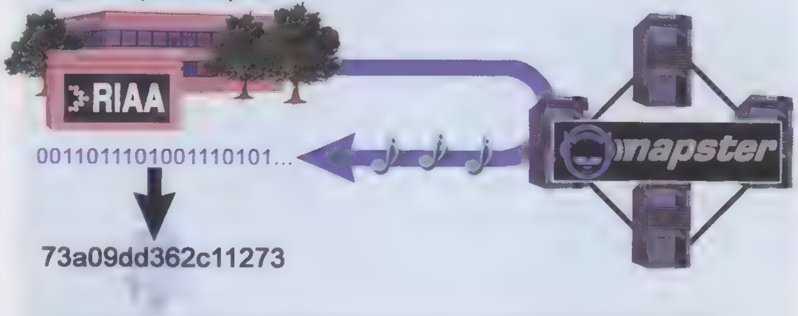
Please wait while you're redirected. When a user would click an RIAA-doctored MP3 file, it would download a Trojan horse that would redirect you from the P2P site with illegal file sharing to a pay-per-download online music site.

Likelihood: good chance. The courts probably wouldn't find this tactic illegal; it doesn't do any real damage to the user's computer. And it would convince those users who are jittery about illegally downloading MP3 files to try a fee-based site and download the MP3s legally.

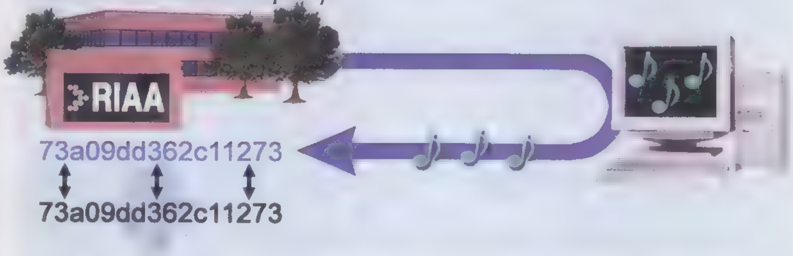
The big freeze. If you clicked one of the RIAA's doctored MP3 files, it would unleash a

Building The Case

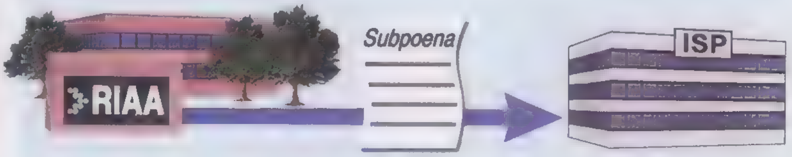
Although the RIAA hasn't officially stated how it plans to build its legal case against those who've been accused of illegally downloading copyrighted songs, court documents and speculation from experts have allowed us to piece together a potential plan for the RIAA.



During the height of the original Napster file-sharing service, the RIAA downloaded copies of thousands of pirated songs from the service. With those songs in hand, the RIAA used hash values, which are essentially numbers generated from strings of text by an algorithm (such as MD5), to develop a digital fingerprint of each song. The MD5 hash algorithm creates a 128-bit digital fingerprint of a file by accessing its binary code. P2P networks also commonly use MD5 to validate file quality.



With the digital fingerprint developed, the RIAA can then scan the public directories of users on P2P networks, using scanning software it has developed. When the RIAA finds a copyrighted file in an individual's shared folder, it downloads the song from the file-sharing participant and compares the MD5 hash from the recently downloaded song to the MD5 hash from the song it downloaded earlier from Napster. If the MD5 hash matches, the RIAA assumes the file is an illegally downloaded copy instead of a digital copy created from the user's own CD. The RIAA also examines metadata tags, such as ID3 tages, which are bits of data embedded with MP3 files that store information about the file, including the song title or the artist's name. If the metadata tags within the defendant's digital music files match those from music files known to be pirated, the RIAA has some additional evidence.



The RIAA then figures out which ISP is providing Internet access to the file-sharing participant and subpoenas his ISP, looking for data that matches his file-sharing service username with his personal data in the physical world. With that information in hand, the RIAA then may choose to file charges against the person.

freeze attack on your PC or on your Internet connection. The attack could lock up your computer for a few hours, or it could flood your IP address with traffic, rendering it useless for a few hours or more.

Likelihood: little chance. Such technology would be difficult to implement and could place the RIAA on shaky legal ground, especially if a user lost some data because of the freeze attack.

Cold Turkey

Outside of politics, religion, and sports, few topics push people to anger as quickly as the debate over the merits of music file swapping. Just check out any of several bulletin boards devoted to file swapping, and you'll see almost as many unique angles on the subject as there are postings.

Regardless of your feelings on the subject, it's certain that swapping copyrighted files is illegal under current U.S. copyright laws, and the RIAA has begun applying heat to those trying to skirt the law. Realistically, the RIAA cannot sue each of the millions of people who have swapped, are swapping, or will swap music files, but you'll still want to be careful. The RIAA's new vigilance means your swapping habit could land you in trouble.

And now that there are several good options for downloading MP3 files legally, it makes little sense to risk the RIAA's wrath. The new Napster, Apple's iTunes for Windows or Mac, MusicMatch, and Rhapsody all give you some good options for buying MP3s. Dell, AOL, and Amazon.com are considering legitimate MP3 sales, too. Having this option finally lets you select the music *you* want, and that's something you couldn't do when Napster first arrived on the scene. Obviously, you now have to pay for the MP3 downloads, but about 99 cents per song is a small price to pay—literally—for the peace of mind you'll get from staying on the right side of the copyright laws.

by Kyle Schurman

Readers can see www.cpumag.com/cpudec03/riaa for additional information on this topic.

Protect Yourself

By suing individual users, the RIAA has upped the ante in the battle over file swapping. This means you need to take some steps to protect yourself against being the next defendant. Of course, simply employing the following ideas won't fully ensure that the RIAA won't sue you next. The only sure way to avoid an RIAA lawsuit is to not participate in the swapping of copyrighted music files. As you work toward that goal, here are some things to keep in mind.

Keep the numbers low. In its first round of lawsuits, the RIAA typically filed suits against individuals who were offering several hundred or more music files for download. Theoretically, if you keep the number of files in your P2P shared folders at a minimum (maybe a few dozen or less), the RIAA may choose to leave you alone in favor of going after the heaviest users.

Block your hard drive. In some file-sharing software, you can choose not to allow uploads from your hard drive. This should protect you if the RIAA remains focused on those who are offering a lot of files to other users because you'll have zero files to upload. The down side? If all file-swapping users followed this advice, there wouldn't be any files to share.

Hide your shared folder. Some file-sharing programs, such as Kazaa 2.5.1 and newer, let you hide the contents of your shared folder. Another user can still find a single file in your shared folder, but after finding that file, that other user cannot peek through your folder for additional songs. To download from you again, the user would have to hit your shared folder on a new search. This feature would prevent the RIAA from easily counting the number of songs you have in your shared folder.

Rip your own files. So far, the RIAA has focused on suing individuals who are offering copyrighted files they had previously downloaded from a P2P site, as evidenced by its use of hashes (see the "Building The Case" graphic). So, if you must share files, limit yourself to files you've ripped from your own CD collection. Although offering such files is still illegal, the RIAA doesn't yet seem to be as concerned with those types of users.

Mix the hash. The RIAA apparently is identifying file swappers using **hash values**, which are essentially numbers generated from strings of text by an algorithm. The FBI has used hash values as evidence in hacker cases in the past. If the hash of a copyrighted music file on your hard drive exactly matches one that has come from a file-swapping site, the RIAA says the chances are strong that your file came from an illegal download rather than from your own CD collection. (Most copyright lawyers say the owner of a CD can legally transfer the song to his computer for personal use.) However, you can change the hash of the file on your hard drive by changing the file contents, such as stripping or editing the ID3 tags in the MP3 files. Several pieces of freeware and shareware software exist that can edit ID3 tags, including Tag&Rename and Media Tagger. Your MP3 ripping software can often edit ID3 tags, too. (Keep in mind that changing the hash could harm the effectiveness of the P2P software in finding files on your hard drive to share with other users.)

Hide behind your ISP. Although the 1998 Digital Millennium Copyright Act allows music companies to obtain the personal information of those suspected of illegally swapping copyrighted music files from an ISP, some ISPs are refusing to hand over the information without a court battle. If you're worried that you might be next on the RIAA lawsuit list, you may want to find an ISP who is willing to attempt to protect your identity.

Join the counter movement. One way to prevent lawsuits would be to change the copyright laws to favor individuals. Visit Web sites such as www.boycott-riaa.com, www.downhillbattle.org, and www.eff.org/share/petition for the latest news on the battle against the RIAA and for tips on how you can help.

COMPONENTS THAT KEEP ON GIVING

An Ultimate Holiday Computer Shopping Guide

Santa's going to grant you one wish this Christmas. (Provided, of course, you've been a good boy or girl.) So, what'll it be? An all-expense-paid trip to the Caribbean? A skydiving adventure where you'll plunge 130mph to earth? A comfortable winter evening curled up in front of a roaring fire or a frigid black-diamond run in the Canadian Rockies? Does comfort take precedence over excitement? We think not.

See, power users have a tendency to ride the bleeding edge of technological progress. They delight in the latest and greatest components available, although the slope of extreme computing is often rife with moguls. After all, the very best hardware is exorbitantly priced and prone to teething pains. So, while Caribbean beaches are undoubtedly relaxing, there's something genuinely special about absorbing oxygen through osmosis during freefall.

If you get your kicks ogling the latest graphics cards and other components—even the ones you can't afford—get ready for some hard-core eyeballing. We've assembled the best parts on one test bench and priced out an entire system. Understanding that some of these parts are in short supply and others are simply unnecessary if you already have a respectable rig, we've also provided a list of capable alternatives.

Just to make things interesting, we also compared this system against the Dream PC we built last year (December 2002 *CPU*)—which incidentally is still a powerful machine—in a couple of the benchmarks. Our new system powers through SYSmark2002 30% faster and scores 45% higher in 3DMark 2001 SE. Further, the Unreal Tournament 2003 Flyby demo is about 30% faster on our new rig. Check out the rest of our benchmarks, including modern games, workstation graphics, and encoding metrics in the "Benchmarking Our Ultimate PC" chart.

Processor

AMD Athlon 64 FX-51
($733 in quantities of 1,000; provided by AMD; www.amd.com)

AMD's Athlon 64 was a hot topic back in 1999 when it was codenamed

Spotlight Contents

50 Components That Keep On Giving
An Ultimate Holiday Computer Shopping Guide

60 Your Essential Software Shopping List
Apps & Utilities For Enhancing Your PC

Clawhammer. Originally anticipated in early 2002, manufacturing delays and an immature infrastructure held AMD's plans at bay until the server-oriented Opteron finally materialized in April 2003. Multiple Linux distributions enable the processor's 64-bit operating mode, but supporting applications were and still are rare. Those that do exist are purposed specifically for enterprise computing.

Don't let that bother you, though. Just as graphics card manufacturers need to pave the way for DirectX 9 games through compliant hardware, Athlon 64 is a stepping-stone for an inevitable influx of 64-bit software that will follow. Once Microsoft finalizes its 64-bit version of Windows XP in 2004, optimized third-party applications will fall into place.

For now, AMD is targeting the gaming community with the Athlon 64 FX-51. And while 32-bit performance isn't at the top of AMD's marketing strategy list, the flagship processor is surprisingly adept at plowing through games and content creation apps. In fact, the 2.2GHz FX-51 performs well enough to oust Intel's Pentium 4 3.2GHz from its performance throne.

There are currently two variations on the Athlon 64 theme. The Athlon 64 FX is manufactured using a 130nm etching process that employs silicon-on-insulator technology. Its 1MB of L2 cache and integrated memory controller constitute a significant share of the chip's 106 million transistors, also serving to reduce latencies during main memory accesses. Support for a dual-channel, 128-bit memory bus further complicates things, resulting in the Athlon 64 FX-51 requiring a 940-pin socket interface.

The Athlon 64 3200+ bears the same performance designation as its predecessor, but it also benefits from 1MB of cache and an integrated memory controller, which is limited to a single channel of DDR400 memory. Running at 2GHz, the 3200+ sacrifices some power to its sibling, but at $417, it's an attractive alternative.

AMD Athlon 64 FX-51

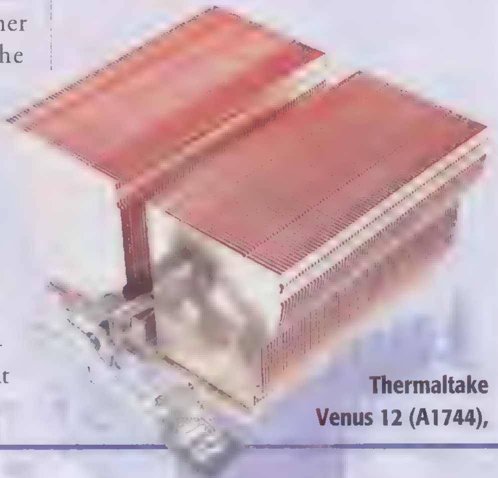
Cost considerations aside, both AMD processors demand accompanying platforms. If you've already invested in a Socket 478 motherboard for the P4, breathe easy. Anticipating a strong showing from the Athlon 64 FX, Intel enhanced its Xeon processor to run at 3.2GHz on an 800MHz bus. But whereas the current 3.2GHz chip sports 512KB of cache, the new Extreme Edition wields an additional 2MB of L3 memory. The CPU isn't quite as fast as the Athlon 64 FX, but it's a drop-in replacement for any P4 that utilizes an 800MHz FSB.

"What about the Prescott core?" you ask. More than likely, it won't see retail availability until early 2004. Intel indicates it will operate faster than the 3.2GHz P4, but it remains to be seen if the additional clock speed and new instructions are enough to overpower the Extreme Edition.

Heatsink

Thermaltake Venus 12 (A1744)
($33; provided by Thermaltake; www.thermaltake.com)

Lust after the FX-51 as you may; there aren't many of them to go around, and the majority of those that are available are of the OEM variety, meaning they don't include heatsinks. Yet, every Athlon 64 FX that rolls out of AMD's plant features an unlocked clock multiplier, making the CPU a prime target for overclocking.



Thermaltake Venus 12 (A1744),

If you buy an OEM chip and aspire to tweak it, consider Thermaltake's Venus 12 cooler. Perhaps its most attractive feature is an 80mm variable-speed fan that moves 73 cubic feet of air running at 5500rpm, thereby generating a raucous 48dB. Of course, if you don't plan to overclock, copious airflow isn't as necessary, in which case the Venus supports adjustable fan-speed control, as well. The Venus 12 includes two means for adjusting fan speed. The first method is a 3.5-inch front-panel knob for easy access. The other method is a PCI panel that resides inconspicuously at the back of your chassis. At its slowest 2000rpm setting, the Venus 12 is virtually whisper-quiet.

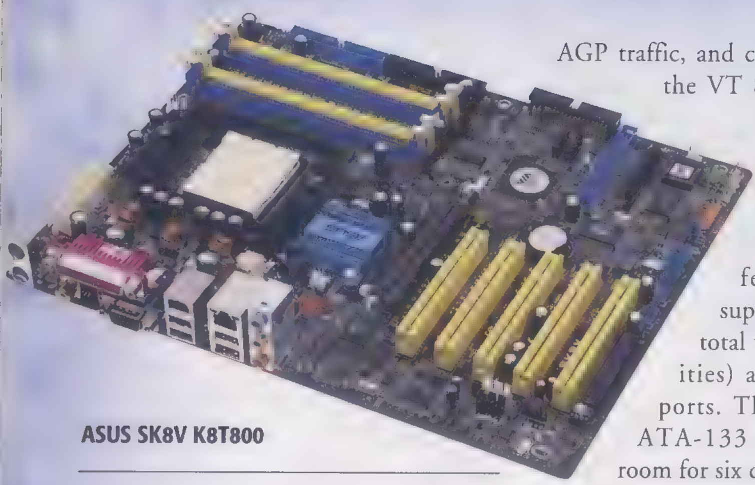
Alternatively, Thermaltake manufactures a low-noise variant called the Silent Boost that incorporates a special fan design. It tops out at 21dB but is limited to 27.5CFM of airflow. So, don't expect it to facilitate increased operating frequencies.

If you opt for the P4 Extreme Edition, Vantec's AeroFlow provides an excellent compromise between cooling prowess and noise generation. Compared to conventional fan designs that employ centralized motor assemblies, the AeroFlow features Yen Sun Technology's tip-magnetic driving fan, which cools the heatsink's copper core more efficiently at up to 5600rpm, generating 38dB of noise.

Motherboard

ASUS SK8V K8T800
($210; provided by ASUS; www.asus.com)

There isn't much selection when it comes to fully featured Socket 940 motherboards. The majority of those that do exist accommodate server apps; they often lack enthusiast-oriented features and sacrifice performance in favor of impeccable stability. ASUS has a solid reputation for catering to both markets concurrently,



ASUS SK8V K8T800

though, and its SK8V is an exemplary union of the two.

The board enables every feature of VIA's K8T800 chipset, including integrated 10/100 Ethernet, six-channel audio through an AC'97 codec, and six USB 2.0 ports. A Texas Instruments FireWire controller is incorporated, as is Promise's SATA RAID controller. 3Com's 3C940 ASIC delivers GbE (Gigabit Ethernet) support, accessible through an RJ-45 port on the board's back panel. The SK8V is also equipped with ASUS' own Wi-Fi slot that supports an 802.11b card of its own design. According to ASUS' Web site, the slot will work with an upcoming 802.11g card, as well.

Most of the performance characteristics of an Athlon 64 platform are attributable to the processor itself. It takes care of computing, of course, in addition to directing memory traffic. The SK8V may look like a traditional mobo, but its four DIMM slots actually connect directly to the Athlon 64 FX through a 128-bit bus capable of transferring 6.4GBps. Consequently, you need to install memory modules in pairs. (ASUS color-codes the slots to ease the process.) The SK8V accommodates an incredible 8GB of DDR400 memory. However, memory must be registered or the board simply won't boot.

Because of Athlon 64 FX's integrated memory controller, the job of VIA's K8T800 north bridge is less pronounced. Fundamentally, it's responsible for interfacing with the processor, controlling AGP traffic, and communicating with the VT 8237 south bridge, from which the SK8V derives a majority of its functionality. The most notable features are SATA support (four channels total with RAID capabilities) and eight USB 2.0 ports. There are also three ATA-133 connectors with room for six drives.

Perhaps you're wondering why NVIDIA's lauded nForce3 150 isn't the platform of choice. Capable as it may be, nForce3 lacks some features the K8T800 offers, including native SATA and GbE. Accordingly, the SK8V turns out to be a bit more attractive for enthusiasts. NVIDIA's nForce3 250Gb should emerge by year's end, though, bringing with it GbE, four channels of SATA with RAID, and eight USB 2.0 ports, all in the same single-chip package. NVIDIA will include a comprehensive software package with the chipset, consisting of a RAID Rebuild Array Wizard, System Utility with on-the-fly overclocking, and an advanced audio mixer. Unfortunately, it doesn't look like the popular SoundStorm audio processor will be part of the nForce3 package.

Should you opt for a P4 platform, Intel's 875P persists as the chipset of choice for performance enthusiasts. ABIT's IC7-MAX3, in particular, is popular among overclockers, sporting six channels of SATA connectivity, GbE (compliments of Intel's CSA architecture), six-channel audio, FireWire, and USB 2.0. However, the best part is that ABIT adapts its OTES technology to cool the board's power-regulation circuitry, funneling air through an enclosed chamber. At $200, it isn't cheap, but it's one of the most fully featured boards available.

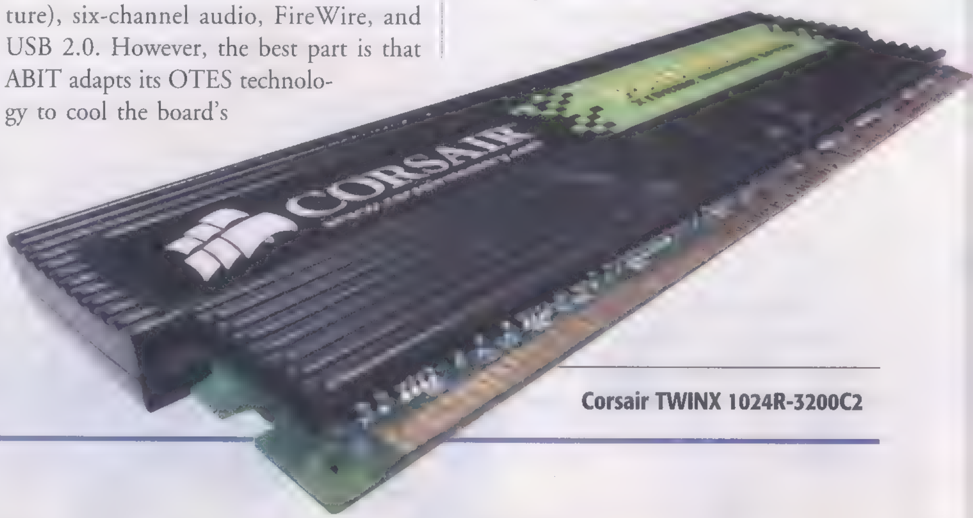
Memory

Corsair TWINX1024R-3200C2 ($290; provided by Corsair; www.corsairmicro.com)

As mentioned, the Athlon 64 FX requires registered memory modules, just like the Opteron. But whereas Opteron is limited to DDR333 support, Athlon 64 FX's memory controller enables DDR400. The high-performance modules are admittedly tough to track down. After all, mission-critical platforms usually employ more mature memory technologies.

Corsair has experience designing both sensitive-server modules and low-latency enthusiast products. Therefore, it's not surprising that Corsair's modules became available shortly after AMD's Athlon 64 FX announcement. The recommended TWINX kit includes two 512MB matched sticks of DDR400 that run at 2-3-3 timings. Each pair is tested together on an ASUS SK8N motherboard and immediately packaged, ensuring compatibility in the necessary dual-channel environment.

Between the processor, motherboard, and memory, Athlon 64 FX is an unquestionably expensive proposition. Intel's P4 Extreme Edition is also pricey, but if you're happy with your current Athlon XP or P4 system, consider a simple memory upgrade. The recently released XMS Pro series modules include enhanced cooling and LED



Corsair TWINX 1024R-3200C2

activity lights to monitor memory traffic. If nothing else, they make for a great aesthetic addition to any modded system.

Graphics Card

ATI Radeon 9800 XT 256MB ($500; provided by ATI; www.ati.com)

It isn't easy to choose a performance victor in a market that shifts with every fresh driver revision. Nevertheless, ATI established a viselike grip on the high-end last year, and it maintains a quantifiable advantage with its Radeon 9800 XT this time around. The differences between the 9800 XT and its predecessor are subtle (in terms of performance, at least).

TSMC manufactures the R360 core on a 130nm process, just like the R350 and R300 cores before it. Enhancements allow the new core to run at 412MHz, 32MHz faster than the 9800 Pro. According to ATI, the 9800 XT will only sell in 256MB configurations, with conventional DDR memory modules running at 365MHz.

The 9800 XT's most striking distinction is a redesigned copper fan sink that dominates the card's front and back. Breathe easy; it's still a single-slot solution that fits in most SFF systems. The new cooler sports a much larger fan and a copper construction, all of which fit under a low-profile plastic housing. It attaches to a copper plate that makes direct contact with the memory modules on the back of the 9800 XT. As a final addition, ATI integrates a thermal sensor to the core for monitoring operating temperature. If it pushes a preset threshold, the card's fan spins faster, slowing back down in response to temperature reductions. The result is more effective cooling, less intrusive acoustics, and higher potential for overclocking. In fact, ATI's latest driver set actually sanctions overclocking, albeit to a limited degree. With the Overdrive feature enabled, the 9800 XT runs at its default speed at temperatures above 56 degrees C. It runs at 419MHz between 48 degrees and 59 degrees and a comfortable 432MHz if you can maintain temperatures below 51 degrees.

NVIDIA isn't watching idly, of course. Its GeForce FX 5950 Ultra and GeForce FX 5700 Ultra cards are finally a reality, and the latest 52.16 Detonator driver set improves image quality and performance on the troubled architecture. The large gap that once spanned ATI's flagship and NVIDIA's best effort is narrowing via compiler optimizations designed to wring performance from the GeForce FX.

ATI Radeon 9800 XT 256MB

At the high-end, NVIDIA's GeForce FX 5950 ships with a 475MHz core frequency and matching memory clock, giving it a theoretical memory bandwidth ceiling of 30.4GBps. The $500 flagship still consumes two slots for cooling, but realistically, that should only be a problem if you're using an SFF box.

The midrange GeForce FX 5700 Ultra is a more realistic upgrade, especially if your GeForce 2 or 3 card is showing age. NVIDIA boasts that the 5700 centers on a new architecture with three times more vertex processing power than the GeForce FX 5600 series, although those claims don't necessarily translate into drastically improved benchmark results. In reference trim, the GeForce FX 5700 Ultra sports a 475MHz core and 128MB of DDR2 memory running at 450MHz on a 128-bit bus. Third-party manufacturers will undoubtedly release versions with higher core or memory speeds. However, every GeForce FX 5700 Ultra card that hits a retail shelf should sport a single-slot cooler.

Chassis

Cooler Master Wave Master TAC-T01 ($160; provided by Cooler Master; www.coolermaster.com)

Regardless of platform, the chassis you choose says a lot about your tastes. Shuttle's XPC demonstrates an affinity for compactness, efficiency, and style. A midtower ATX enclosure shows you care about expandability and maybe have a mind for modifying.

Cooler Master's Wave Master looks great without any drastic mods. The 17-pound aluminum alloy chassis feels surprisingly sturdy. This curvaceous beauty has a finely machined door that covers four external 5.25-inch bays and a single 3.5-inch bay. There are four more 3.5-inch bays inside, each capable of accommodating a hard drive, and a removable motherboard tray that's easy to work with.

The Wave Master is big, though, making it a tough sell for cluttered apartments and cramped dorm rooms. If you are in the SFF camp, Shuttle and Biostar manufacture particularly attractive alternatives that fit comfortably under a desk. Shuttle's SB75G2 is at the top of the food chain for P4 platforms. It centers on the 875P chipset with all of its trappings, such as Intel's PAT technology, dual-channel DDR400 support, SATA RAID,

Cooler Master Wave Master TAC-T01

and GbE. Biostar's iDEQ 200P box delivers many of the same technologies, but it is powered by NVIDIA's nForce3 150 chipset.

Biostar's box comes with its own 200W power supply (a little on the weak side), and the Shuttle system has a 220W unit. If you opt for the Wave Master, though, you will need to buy a power supply to go with it. Enermax recently announced its Noisetaker P model, which includes several useful features. Namely, the Smart Fan runs for two minutes after the system powers down to continue cooling hot components. Independent 12V rails deliver a stable current to the processor and mobo, while ATX 1.3 compliance ensures compatibility with the latest P4 and Athlon 64 systems. Of course, it's also nice to see Enermax including SATA power connectors.

Sound Card

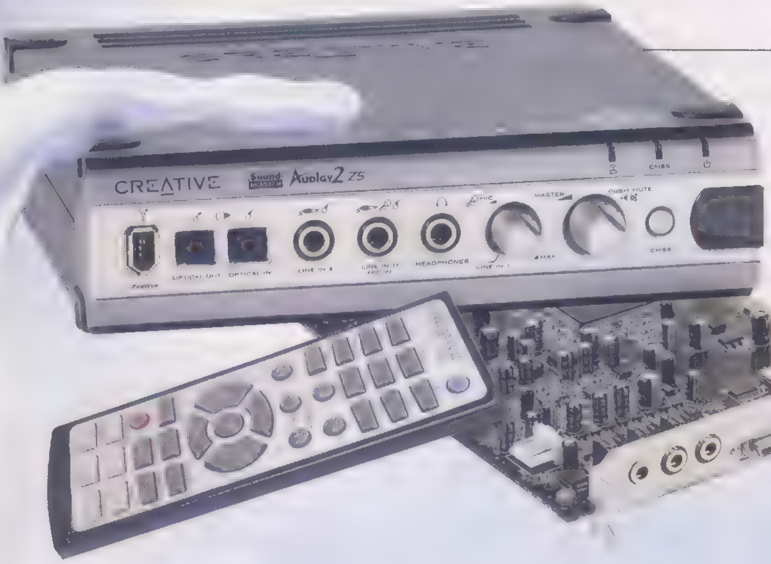
Creative Labs Audigy 2 ZS Platinum Pro ($250; provided by Creative Labs; www.creative.com)

The sound card market isn't known for neck-in-neck competition, "fall refreshes," or six-month product cycles. Yet, it seems NVIDIA's passion for all things multimedia has sent Creative Labs into an uncharacteristic tornado of self-improvement. Its Audigy 2 isn't even a year old and there's already an improved version on store shelves.

The Audigy 2 ZS Platinum Pro is the most extensive audio product in Creative's new Audigy 2 ZS family; it's the only card to include an external breakout box. Those who've previously used high-end Creative Labs cards will be familiar with many of the box's functions. Its feature list includes six-channel input via analog stereo connectors, optical and coaxial digital in/out, microphone input, headphone output, and a pair of FireWire ports. Further, an integrated receiver and included remote enable distanced control should you add the Audigy 2 ZS Platinum Pro to a home theater.

The card itself is also very similar to its predecessor. However, it does boast a 108dB SNR across all eight of its channels, indicating that Creative Labs indeed made hardware improvements. Most new features are software add-ons, though. For example, EAX 4.0 Advanced HD enables four separate environments delivered in 7.1-channel surround sound through a driver release. A software decoder supports both Dolby Digital EX and DTS-ES. Unfortunately, the Audigy 2 ZS can't encode a Dolby Digital signal, such as NVIDIA's own Audio Processing Unit. The card maintains its 24-bit resolution and 192KHz sampling capability in stereo mode, along with 24-bit and 96KHz input.

Perhaps the card's most appealing aspect is its diverse audience. Gamers will appreciate multichannel surround in any application enabled by DirectSound 3D. And when Half-Life 2 emerges, you'll certainly want an immersive sound stage on which to experience it. Armed with a capable speaker system, movie buffs can enjoy flicks in 7.1-channel audio. The benefits of eight channels are certainly debatable, but it's hard for an enthusiast to argue against the Tim Allen "more power" mentality. Even budding musicians stand to gain from the Audigy 2 ZS' feature set. A set of ASIO 2.0 drivers enable multitrack playback and recording with Direct Monitoring to avoid the inherent latencies associated with OS buffering. The result is better synchronization across various output devices for accurate placement on the original device.



Creative Labs Audigy 2 ZS Platinum Pro

For alternatives, consider waiting until next year for a sound system upgrade. Rumor has it that NVIDIA is working on a standalone model of the SoundStorm audio processor designed to enable real-time Dolby Digital encoding. Though officials won't comment on the product, all indications point to an early 2004 announcement.

M-Audio's Revolution 7.1 is another respectable alternative that offers many of the same features as the Audigy 2 ZS, including 7.1-channel output and Dolby Digital/DTS decoding, all for around $90.

Speakers

Creative MegaWorks THX 6.1 650 ($330; provided by Creative Labs; www.creative.com)

Investing in a Swiss Army sound card will only take you halfway to owning a sweet setup. The other half involves picking up a speaker system comparable to your card's potential. Of course, you could go a million directions, right up to Verity Audio's $55,000 Lohengrin loudspeaker. This is a computer, though, and so we will stick to multimedia components. Naturally, the Audigy 2 ZS begs for a powerful surround sound system, preferably something with more than six channels.

Creative Labs' MegaWorks 6.1 650 is a THX-certified, 6.1-channel configuration that delivers 575W RMS. Moreover, it

Creative MegaWorks THX 6.1 650

works exclusively with the Audigy 2. (If you buy a competing sound card, look into a Klipsch or Logitech system.) Each of the six satellites sports a 3.5-inch full-range driver, while the system's wooden subwoofer wields an 8-inch long-throw driver. Five satellites receive 70W each of RMS power, the center gets 75W, and the subwoofer 150W.

The 6.1 650 is sufficiently beefy and sounds great to boot. Musical reproduction is accurate, even if the 3.5-inch drivers suggest particularly heavy representation of midrange instruments. Theatrical sound effects similarly erupt distortion-free.

There's only one obvious downside to the 6.1 configuration: It doesn't utilize the Audigy 2 ZS' 7.1-channel capabilities. Thus, the GigaWorks S750 will be a breath of fresh air when it becomes widely available later this year with 7.1-channel output. The amplifier backing the system is rated at a numbing 700W RMS, with 210W dedicated to the eight-inch subwoofer. Moreover, each satellite includes the same 3.5-inch driver you'll find on the MegaWorks 6.1, in addition to a titanium tweeter that extends highs up to 40KHz. Expect the GigaWorks setup to cost around $500. As with any other high-end component, you have to pay to play.

If you don't have the room for a multimedia surround sound system, or you would rather use the money for real home theater equipment, look at Logitech's Z-2200. The 2.1-channel package is small, but its THX certification is a prelude to 200W power and an impressive 100dB SNR. At $150, the Z-2200 is an ideal compromise between price and performance.

Networking Equipment

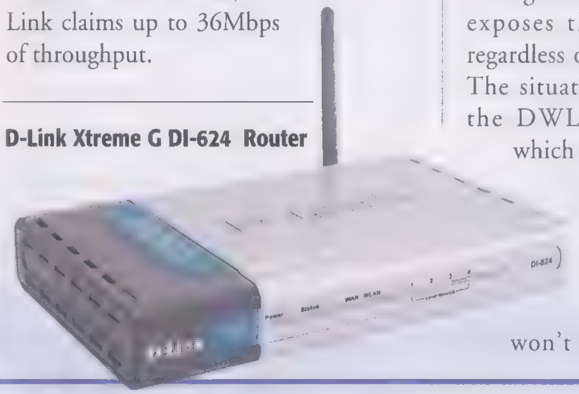
D-Link Xtreme G DI-624 Router & D-Link DWL-G520 PCI Adapter

(DI-624: $109, DWL-G520: $70; provided by D-Link; www.dlink.com)

D-Link's Xtreme G family has been around awhile now, but like any other solid piece of hardware, it continues to evolve. A recently released firmware update pushes the DI-624 to support bandwidth up to 108Mbps. D-Link's Michael Scott claims that the upgrade procures real-world throughput of about 60Mbps, or 36% better performance than its closest competitor.

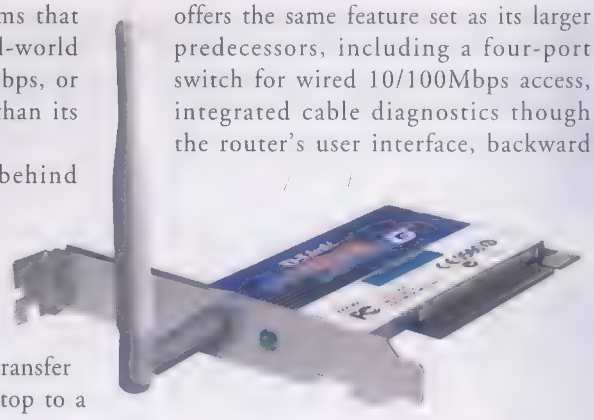
There's some weight behind that claim, too. Last year, D-Link's 54Mbps 802.11a router pushed 1.8MBps of throughput, while this year's Xtreme G hits 4.2MBps in a similar file-transfer test from one wireless desktop to a wired recipient. Keep in mind that the 108Mbps capability carries one important stipulation: The wireless network clients need to be similarly enabled D-Link products, either the DWL-G520 PCI Adapter or DWL-G650 Cardbus Adapter. Even in a mixed-mode, multivendor environment, D-Link claims up to 36Mbps of throughput.

D-Link Xtreme G DI-624 Router



How? Atheros' Super G technology employs a combination of new wireless technologies to augment performance. Packet Bursting, for instance, allows more data per packet. This is part of the 802.11e QoS (Quality of Service) draft spec, which promises to support bandwidth-sensitive apps upon completion. The fast frames feature is another 802.11e contribution that accelerates data frame timing, effectively bolstering the Packet Bursting technology. Further, the Atheros AR5002 chipset compresses and encrypts data in real-time for another throughput boost.

In addition, the DI-624 router has shrunk since we looked at it for the May 2003 issue. Revisions A and B of the DI-624 are a bit bulkier and sport two antennas. Unfortunately, the firmware updates for the older products aren't yet available. The third revision, Rev C, offers the same feature set as its larger predecessors, including a four-port switch for wired 10/100Mbps access, integrated cable diagnostics though the router's user interface, backward compatibility with 802.11b products, and Wi-Fi Protected Access mode.



D-Link DWL-G520 PCI Adapter

Current DWL-G520 PCI Adapter owners can enjoy the faster bandwidth setting immediately; the latest driver set exposes the feature on every card, regardless of when it was manufactured. The situation isn't quite the same for the DWL-G650 Cardbus Adapter, which has undergone multiple revisions since its inception. Check D-Link's Web site for more details.

Frankly, casual Internet usage and online gaming won't tax a 108Mbps connection.

Streaming video and network file sharing will. In either case, more bandwidth is always a good thing. On the off chance you can live without a high-speed connection and you need every ounce of throughput possible, there's always a GbE connection to fall back on. Most enthusiast mobos already include an integrated controller, after all.

Hard Drive

Maxtor 250GB SATA Ultra Series Hard Drive Kit (x2) ($340 each; provided by Maxtor; www.maxtor.com)

SATA technology has several benefits. To begin with, SATA drives are theoretically faster than traditional PATA devices, even if the differences are slight. Practicality is a more tangible advantage, though. SATA cables are thin, flexible, and may measure up to 1 meter in length.

As a result, SATA is an easy upgrade, especially because it's backward compatible with legacy PATA.

Last year, SATA was hotly anticipated, but drives were in short supply. Now every manufacturer offers a complete lineup of products, from Seagate's super-quiet Barracuda to Western Digital's 10,000rpm Raptor. But Maxtor's monstrous 250GB SATA Ultra series really strikes a balance between performance and capacity, tipping the scales with a 7200rpm rotational speed, 8MB cache buffer, 9.3ms seek time, quiet FDB (fluid dynamic bearing) motor, and 250GB capacity. Because ASUS' SK8V offers native support for SATA RAID through the VT8237 south bridge, a pair of the 250GB drives in a RAID 0 configuration makes for a perfect match.

Faster drives do exist, if you're willing to sacrifice a little extra money, and often times, capacity. The Western Digital Raptor drive spins at an impressive 10,000rpm and boasts an average access time of 5.2ms. It's a true enterprise product; Western Digital gives the Raptor a 1.2-million hour MTBF and five-year warranty to back that claim. The drive's $130 price tag (OEM) is reasonable, too, but its 36.7GB capacity is somewhat of a letdown. Fortunately, WD recently announced plans to unveil a successor with room for 74GB of data and command-queuing technology for increased efficiency.

Of course, there's always the SCSI option. "Not only is it a popular choice for demanding enterprise applications," says Seagate's David Szabados, "but SCSI is also a great choice for video-editing enthusiasts." The 147GB Seagate Cheetah 10K.6 spins at 10,000rpm but utilizes the Ultra320 SCSI interface. At $700, it's much more expensive, but the Cheetah family is lauded for performance and reliability—desirable qualities in a content creation workstation.

Maxtor
HARD DRIVE
Maximize your Performance
SATA World's fastest ATA interface
SATA ULTRA SERIES
250GB
7200RPM
Serial ATA/150
8MB CACHE
• Ultimate SATA drive performance
• RAID ready
• Whisper-quiet FDB motor

Maxtor 250GB SATA Ultra Series Hard Drive Kit (x2)

Benchmarking Our Ultimate PC

SYSmark2002		
Internet Content Creation	401	
Office Productivity	251	
Overall	317	
AquaMark 3	(1,024 x 768)	
CPU	9731	
GFX	6489	
3DMark03	6643	
CPU	833	
Specviewperf 7.1		
3DS Max 02	13.75	
Design Review 09	48.59	
Data Explorer 08	73.2	
Lightscape 06	15.39	
Pro/Engineer 02	16.16	
Unigraphics 03	28.34	
Unreal Tournament 2003	(no AA, no AF)	(6X AA, 16X AF)
Flyby	149.3	69.8
Botmatch	97.3	47.3
GunMetal	(1,600 x 1,200 with 4X AA) Benchmark 1	(1,600 x 1,200 with 4X AA) Benchmark 2
	17.99	23.05
ScienceMark		
Molecular Dynamics	81 seconds	
Primordia	377 seconds	
3DMark 2001	21105	
XMPEG with DivX 5.02	87.3fps	
Sandra MAX3	4915MBps Int.	4888MBps Float

Optical Drive

Plextor PX-708A DVD±R/RW Drive ($242; provided by Plextor; www.plextor.com)

It used to be that if you wanted the best of the DVD playback and CD burning worlds, you'd buy separate drives for each task. Now a top-of-the-line DVD±R/RW drive covers your bases. Plextor's PX-708A reads DVD-ROM at 12X and writes CD-R discs at 40X. Faster specialized drives are available, but this is a combo product, ideal for SFF systems that only offer one 5.25-inch bay.

Plextor PX-708A DVD±R/RW Drive

What really sets the PX-708A apart from its competition is the ability to burn DVD+R discs at 8X, or in a little less than nine minutes. The PX-708A is Plextor's first dual-format drive, so it also supports 4X DVD-R, 4X DVD+RW, and 2X DVD-RW. A couple of Plextor's popular CD-R technologies carry over to the PX-708A, including PowerRec and Buffer Under Run Proof. Don't worry about trying to track down 8X media. Several manufacturers offer 4X media that works just fine at 8X speeds.

Several drives capable of burning DVD+R media at 8X will soon join the PX-708A, including Sony's DRU-530A and Optorite's DD0401. Word has it that Pioneer's upcoming DVR-A07 will actually support 8X DVD+R *and* -R, so it might be worthwhile to wait for that one.

Back To The Future: Your New Computer In 2005

We would have had a hard time predicting Intel's Pentium 4 Extreme Edition last year. However, SATA, the Athlon 64, and 802.11g's finalization were all on roadmaps, so we saw them coming. Using a bit of investigative research, a crystal ball, and some plain common sense, we're predicting what your computing experience in January 2005 will be.

The processor scene promises to get even more exciting. Intel's successor to the Prescott core, codenamed Tejas, should be out on its 775-pin interface. A proliferation of DDR2 memory will enable synchronous bus speeds of 1066MHz, and the processor is set to approach 5GHz. Expect improvements to Hyper-Threading and some other new instructions, as well as a larger L1 data cache.

AMD will continue with its Athlon 64, eventually transitioning to the San Diego core in 2004. Equipped with the same 128KB of L1 cache and 1MB of L2 cache, San Diego looks to be a 90nm process shrink more than anything else. It is a high-end core, so it's very likely AMD will persist with an integrated dual-channel memory controller.

Forecasting graphics technology is even more perilous than trying to pin down the volatile processor market. Company roadmaps are carefully veiled. It isn't a secret that 2004 will see the adoption of PCI Express, though. ATI and NVIDIA have plans to release complimentary architectures, R420 and NV40, respectively. Even newcomer XGI is talking about a PCI Express version of its Volari. However, it isn't far-fetched to imagine holiday shopping for an NV45 or successor to R420 next year.

And there's a good chance you'll be doing that shopping from your hot tub, even if you don't have a wireless network of your own. Pundits are speculating that products based on the IEEE 802.16a wireless broadband standard could be available as soon as mid-2004, potentially enabling wireless connectivity over a 30-mile range at speeds up to 70Mbps. Ultra Wideband may also be a viable technology by 2005, linking high-bandwidth devices over short distances to enable relaying of HD signals from, say, a receiver in your living room to a television in the basement. ▲

Display

Dell 2001FP 20-inch LCD ($900; provided by Dell; www.dell.com)

Arguably the most important peripheral connected to your PC is a display. The perpetual debate goes back and forth between a traditional CRT for gaming or a stylish LCD for productivity. Both sides have valid arguments, but it's a safe bet those who favor bulky CRTs haven't seen Dell's new 20-inch 2001FP LCD. Not only is it extraordinarily elegant (Dell recently redesigned its flat-panel lineup), but it also performs on demand.

The 2001FP's rugged construction is apparent right off the bat. The display and

Dell 2001FP 20-inch LCD

Dell 2001FP 20-inch LCD

stand snap together easily without tools; they detach just as quickly. A 0.7-inch bezel minimizes the screen's space consumption, while a height-adjustable stand lets you arrange the 2001FP for your desk or match another display if you're creating a multi-monitor environment. The panel swivels, tilts, and pivots to support a portrait landscape. (ATI's drivers don't support this feature; NVIDIA's do.) Ergonomically, the 2001FP is a dream come true.

The display's connectivity options included DVI-D, D-Sub, S-Video, and composite inputs. Moreover, a picture-in-picture mode lets you watch a stream from a video input while you work. An integrated USB hub offers four USB 2.0 ports, two on the side and two behind the display.

The 2001FP's performance is what makes it a standout, though. A big gripe about LCD gaming is scaled picture quality at nonstandard resolutions. Well, the 2001FP natively runs at 1,600 x 1,200, which perfectly complements the Radeon 9800 XT. Even with antialiasing and anisotropic filtering maxed out, the combination can turn out great frame rates in UT2003. There isn't much ghosting either, as the 2001FP has a 16ms response time. Frankly, it's tough to ask for a nicer display.

Flat-panel prices have come down significantly, but the 2001FP still is $900. There are plenty of other options, such as NEC's 17-inch MultiSync 1760NX-1 looks sharp, sports a similarly quick 16ms response, and offers both digital and analog inputs. CPU

by Chris Angelini

What To Buy Your Friendly Hardware Aficionado

Buying hardware is a lot like buying clothes. Unless you really know the person you're buying for, you'd better reconsider and invest in gift certificates. Or, you could use our list of hardware option to guide your shopping spree. Think of it as a who's who of what to own this holiday season.

Processor

☐ AMD Athlon 64 FX-51; $733
☐ Intel 3.2GHz Pentium 4 Extreme Edition; price unavailable

Heatsink

☐ Thermaltake Venus 12 (A1744) for Athlon 64 FX-51; $33
☐ Vantec AeroFlow (VP4-C7040) for Pentium 4; $25

Motherboard

☐ ASUS SK8V K8T800; $210
☐ ABIT IC7-MAX3 875P; $210

Memory

☐ 1GB Corsair TWINX1024R-3200C2 for Athlon 64 FX-51; $290
☐ 1GB Corsair TWINX1024-3200C2PRO for Pentium 4/Athlon XP; $285

Case

☐ Cooler Master Wave Master TAC-T01; $160
☐ Shuttle SB75G2 XPC; price unavailable

Power Supply

☐ Enermax Noisetaker P Model EG475P-VE; price unavailable

Graphics Card

☐ ATI Radeon 9800 XT 256MB; $500
☐ NVIDIA GeForce FX 5700 Ultra 128MB; $200

Sound Card

☐ Creative Labs Audigy 2 ZS Platinum Pro; $250
☐ M-Audio Revolution 7.1; $90

Speakers

☐ Creative Labs MegaWorks THX 6.1 650; $330
☐ Creative Labs GigaWorks S750; $500
☐ Logitech Z-2200; $150

Networking Equipment

☐ D-Link Xtreme G DI-624 802.11g Wireless Router, $109; D-Link DWL-G520 Wireless PCI Adapter, $70

Hard Drive

☐ Maxtor 250GB SATA Ultra Series Hard Drive Kit (x2); $340 each
☐ Western Digital Raptor; $130

Optical Drive

☐ Plextor PX-708A DVD±R/RW Drive; $242
☐ Sony DRU-530A; price unavailable

Display

☐ Dell 2001FP 20-inch LCD; $900
☐ NEC MultiSync 1760NX-1 17-inch LCD; $450

Total for our PC's components: $4,607

(Assuming roughly $100 for the power supply, which wasn't available yet.)

Introducing a whole new way to carry your files.

Presenting the go-anywhere, carry-anything ThumbDrive, from Memorex.

Whether you're looking for performance or style, the Memorex ThumbDrive® wins hands down. Incredibly small and durable, this beautifully sculpted drive represents the very best of Flash technology. With capacities ranging from 128MB to 1GB, it transfers tons of photos, music or data at rates up to 50% faster* than competitive USB™ 2.0 products. And the USB connection means it's compatible with both PC and Mac,® as well as many portable electronic devices.

The go-anywhere, carry-anything, sleekly-styled ThumbDrive from Memorex—this thumb deserves a hand.

Memorex®

Is it live or is it Memorex?™

3 Memorex Products, Inc. www.memorex.com All trademarks and registered trademarks are of their respective owners

d on competitive published information

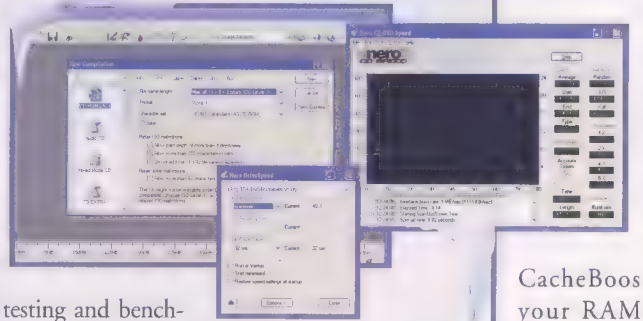
YOUR ESSENTIAL SOFTWARE SHOPPING LIST

Apps & Utilities For Enhancing Your PC

No hardware is ever good enough, not even in a dream PC. Fortunately, there is plenty of software out there that can help enhance your hardware, either by offering better performance or new functionality. We've searched around for some of the best such apps available and trust you'll find plenty here to keep you tweaking all through 2004.

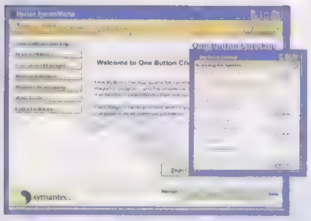
Utility Suites

Ahead Software Nero 6 Ultra Edition ($99.99; $69.99 download). With a fleet of bundled applications, Nero Burning ROM, probably the best burning app in existence, is still the anchor of Ahead's flagship suite. Ahead also throws in a backup utility, MPEG-2/4 player, multitrack audio editor/mixer, wave editor, an imager for creating virtual CDs on your hard drive, and InCD 4 for packet writing. Nero Toolkit provides optical drive and media testing and benchmarking, including the ability to create test discs for use in systems that don't have Nero installed. The DriveSpeed utility also lets you control drive spin rates to help reduce noise when you need a quiet environment. Don't cry, but the little label-pressing gadget is not included in the download version.



www.ahead.de

Symantec Norton System Works 2004 ($69.95). In some ways, it's too bad you can't just buy Norton Utilities anymore. After all, the title has been a main staple of conscientious PC owners for many years and now features file storage optimization, automatic detection and fixing of disk problems, WinDoctor, the UnErase Wizard for retrieving deleted files, and the oft-overlooked Wipe Info for really deleting sensitive data from your system. On the other hand, buying Utilities in the System Works suite makes good sense. Symantec provides the industry-leading antivirus title (GoBack, for reverting to a prior system state), the new Password Manager, and much more. We've also found that System Works doesn't place the same crippling burden on PC performance that it did in previous years. Apart from a firewall, there are few applications we would place higher on a "must-have" list than System Works.



www.symantec.com

Memory & Cache Management

Magellass MemMonster ($25). There's more than one way to boost memory performance. As an alternative to Cacheboost, give MemMonster a spin. This title enhances system speed and stability by freeing up memory sources no longer needed by the applications claiming the resources and moving some applications out to virtual memory from main memory. MemMonster also claims to identify programs that can make your system less stable so you can decide whether to remove them. With lots of options for the tweak-minded, this background applet may be just the thing your crash-prone Windows PC needs.

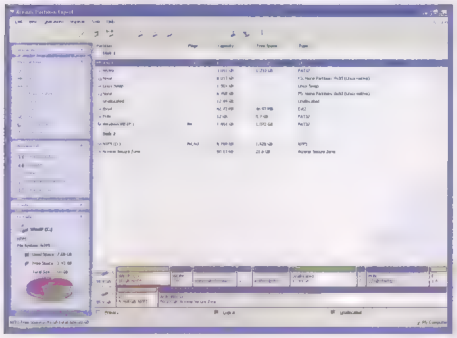
www.magellass.com

Systweak CacheBoost Professional ($29.95). In a nutshell, CacheBoost fine-tunes the process of managing system cache within Windows NT4/2000/XP and Windows .NET Server. It runs as a background service, even if there is no user currently logged in. CacheBoost perpetually defragments your RAM, unloads unused system modules, empties out the system cache when it gets too large, and repairs memory leaks, with the idea being that a Windows system that has been in use for a week should still feel like it was freshly booted. There are plenty of manual settings, but the automatic mode serves just as well in most cases. According to Systweak's tests, CacheBoost can result in a higher than 50% performance improvement in memory-intensive tasks. Try the free trial and see for yourself.

www.systweak.com

Hard Drive

Acronis PartitionExpert 2003 ($49.99; $44.99 download). Big drives are good. Organizing and managing big drives may not be so good. Storing all applications, data, and the OS on the same partition drags down overall performance as the disk gets fuller. You don't want fragged data files slowing down your operating system, right? Acronis PartitionExpert lets you repartition hard drives quickly and efficiently so that you can keep your OS isolated and efficient. On top of helping increase organization (music files on the M: volume and videos on V: perhaps), creating separate partitions also makes disk imaging, backup, and other system maintenance tasks quicker. Even File Find works more quickly when it has fewer files to examine. Acronis PartitionExpert 2003 is fast, supports a wide range of partition types, and keeps a lot of manual fine-tuning available behind an easy wizard interface for newbies.



www.acronis.com

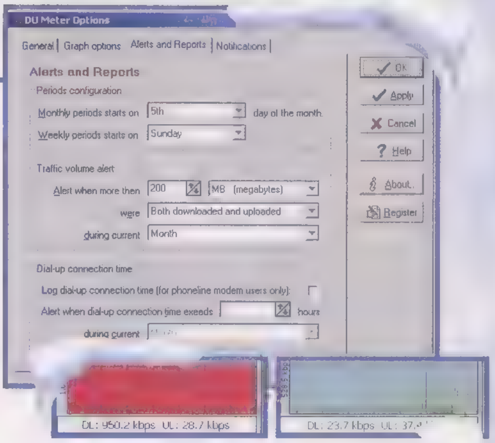
Gibson Research SpinRite 5 ($89). If you still think Windows' built-in CheckDisk and Defrag utilities are the height of drive maintenance, you need to check out SpinRite. This is a must-have, boot disk-based utility for anyone who can't afford a drive crash and still uses FAT-based file systems. (This rules out NTFS-based volumes, such as those created by default under Windows 2000 and XP. Hopefully, the forthcoming version 6, tentatively expected before the year's end, will remedy this.) SpinRite has the rare ability to test the hard drive surface in areas that contain data, whereas most drive tests are read-only and thus cannot accurately ascertain media integrity. SpinRite both alerts you of impending trouble before it strikes and assists in data recovery from damaged areas.

www.grc.com

Networking

Hagel Technologies DU Meter 3 ($19.95). Available in a free 30-day trial version, DU Meter is an excellent tool for monitoring your network connection. On one hand, the application can tell you if your system is using its Internet connection to its full extent. So if you expect to be downloading from your cable connection at peak rates of 1.5Mbps but you're only seeing 300Kbps in DU Meter, you may have a problem. Perhaps more importantly, though, DU Meter's semitransparent, always-on-top graph shows you all uploading and downloading activity, so if you have spyware or unauthorized user activity preying on your system, DU Meter will expose it.

www.dumeter.com



Alerts and Reports

Periods configuration

Monthly periods starts on: 5th day of the month

Weekly periods starts on: Sunday

Traffic volume alert

Alert when more then: 200 MB (megabytes)

were: Both downloaded and uploaded

during current: Month

Dial-up connection time

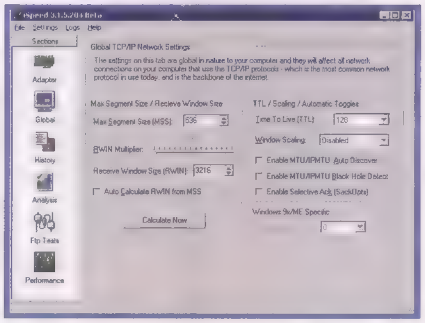
☐ Log dial-up connection time (for phoneline modem users only):

Alert when dial-up connection time exeeds: hours

during current:

DL: 950.2 kbps UL: 28.7 kbps

DL: 23.7 kbps UL: 37.



Global TCP/IP Network Settings

The settings on this tab are global in nature to your computer and they will affect all network connections on your computer that use the TCP/IP protocols - which is the most common network protocol in use today, and is the backbone of the internet.

Max Segment Size / Recieve Window Size

Max Segment Size (MSS): 536

RWIN Multiplier:

Receive Window Size (RWIN): 3216

☐ Auto Calculate RWIN from MSS

TTL / Scaling / Automatic Toggles

Time To Live (TTL): 128

Window Scaling: Disabled

☐ Enable MTU/PMTU Auto Discover

☐ Enable MTU/PMTU Black Hole Detect

☐ Enable Selective Ack (SackOpts)

Windows 9x/ME Specific: 0

High Mountain Software iSpeed for Windows ($10.95; version 2.7.3 is free). Even if you're fluent in editing the Windows Registry, and even if you know which MTU settings to use for which networking connections, do you really want to spend your time fumbling with a clumsy tool such as Regedit? iSpeed for Windows not only helps you select the best Windows settings to optimize your speed but also gives you some nifty bonus tools, such as real-time connection performance monitoring, FTP modules for throughput testing, graphs that visually show where your best connection settings are, and automatic checks for new version releases. iSpeed works on all Windows editions since 95 and can handle both modem and Ethernet NICs simultaneously.

www.hms.com/ispeed.asp

NAT32 Enhanced ($25). Even in this age of broadband access and affordable home routers, many people still have small LANs that connect to the Internet through only one machine. All other PCs have to get online via some method of connection sharing, typically Microsoft's integrated ICS. But ICS has its own well-documented limitations, one of which is that it can only share a single Internet connection. NAT32E picks up where ICS leaves off (and, in fact, can run on top of ICS) by screening many LAN nodes behind a single IP address and running multiple simultaneous Internet connections—good news for anyone employing a Multilink connection. NAT32E contains a DHCP server and can act as a "soft router" if your broadband router fails. The program also facilitates Windows Dial-Up Networking Server in TCP/IP mode, so you can run NAT32E on a broadband-connected machine, dial into it from another PC only equipped with a modem, and share the broadband connection without paying for another ISP account.

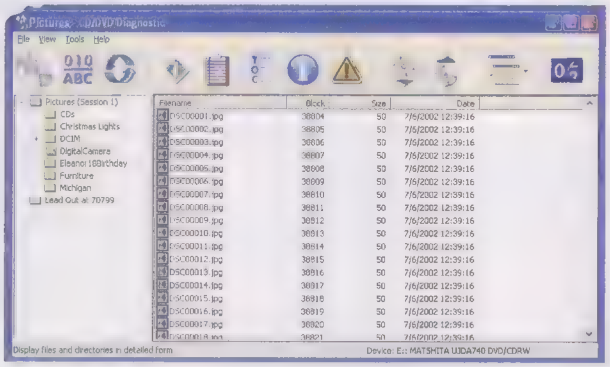
www.nat32.com

Diagnostics & Benchmarking

7Byte Hot CPU Tester Pro ($19.95). Modders and power users are infamous for stressing their motherboards, memory, and CPUs to their limits, so it makes sense to keep a watchful eye on the health and performance of these components. Hot CPU Tester Pro does exactly this with a collection of test modules. The software's primary job is to burn in components (including multiple processors and Athlon 64 chips!), and, unlike some burn-in apps, Hot CPU Tester Pro runs its component threads in parallel, so the system as a whole is taxed. Assuming your system passes a prolonged burn, use the benchmarking tools to keep tabs on your component performance over time. Simple, comprehensive, and inexpensive, Hot CPU Tester Pro is a great alternative to the usual commercial benchmarking apps.

www.7byte.com

Arrowkey CD/DVD Diagnostic ($49.99). Imagine you have critical data—tax returns, corporate strategy plans, foreign military secrets, baby pictures, whatever—and the only copy in existence is on the CD-RW in your pocket. You get the disc home, pop it in your PC, and discover that the files are too damaged to read or have been accidentally deleted. What you need is a deep sector reader such as those used on hard drives, only for optical media. Well, you've got one with CD/DVD Diagnostic. With support for all of the major CD and DVD writing systems, the program takes a microscope to your media and recovers files, which are subsequently written to your hard drive. This can be anything from a 4KB text file to a 4GB video. CD/DVD Diagnostic works through scratched or corrupt media to reconstruct whatever data is possible, although the reading process can take several hours. The program can also easily recover files dropped from the directory structure (a common occurrence with UDF-based discs).



Filename	Block	Size	Date
DSC00001.jpg	38804	50	7/6/2002 12:39:16
DSC00002.jpg	38805	50	7/6/2002 12:39:16
DSC00003.jpg	38806	50	7/6/2002 12:39:16
DSC00004.jpg	38807	50	7/6/2002 12:39:16
DSC00005.jpg	38808	50	7/6/2002 12:39:16
DSC00006.jpg	38809	50	7/6/2002 12:39:16
DSC00007.jpg	38810	50	7/6/2002 12:39:16
DSC00008.jpg	38811	50	7/6/2002 12:39:16
DSC00009.jpg	38812	50	7/6/2002 12:39:16
DSC00010.jpg	38813	50	7/6/2002 12:39:16
DSC00011.jpg	38814	50	7/6/2002 12:39:16
DSC00012.jpg	38815	50	7/6/2002 12:39:16
DSC00013.jpg	38816	50	7/6/2002 12:39:16
DSC00014.jpg	38817	50	7/6/2002 12:39:16
DSC00015.jpg	38818	50	7/6/2002 12:39:16
DSC00016.jpg	38819	50	7/6/2002 12:39:16
DSC00017.jpg	38820	50	7/6/2002 12:39:16
DSC00018.jpg	38821	50	7/6/2002 12:39:16

Display files and directories in detailed form

Device: E:: MATSHITA UJDA740 DVD/CDRW

www.arrowkey.com

SiSoftware Sandra 2004 Standard (free). Sandra 2004 Standard (System ANalyser, Diagnostic and Reporting Assistant, not the developer's girlfriend) is arguably the most comprehensive free benchmarking tool available today. From the CPU and memory out to the LAN connection, Sandra reports on the characteristics of your system and contains numerous benchmarking modules so that you can not only monitor your gear but also compare it to similar equipment in Sandra's database. Some of the modules are accessible only in the versions you have to pay for, but we recommend at least using the free burn-in and performance tune-up wizards. Sandra supports darn near every hardware platform on the desktop, including the new 64-bit processors.

www.sisoftware.co.uk

For Your Connected Gadgets

Red Chair Software Notmad Explorer ($25; $35 for Universal Edition). If you own a Creative Labs music player, do yourself a favor and pick up Notmad Explorer. This gem wastes PlayCenter for ease of use and flexibility. Notmad works through both an Explorer view and a Web browser. Nearly everything is drag-and-drop, and you'll probably never have to look up the support documentation. Want to stream tunes from your device back to your PC so you don't have to keep all those gigs of files on your system? Done: The TrueStream feature cooperates with most major desktop playback software. Notmad can transcode into WMA and OGG, autofill some ID tag data, perform very granular searches, and even be controlled via a Wi-Fi-enabled PDA. Long on features that are must-haves once you experience them, not the least of which is a better-than-50Mbps transfer rate according to our testing, Notmad will more than pay for itself in time savings, never mind coolness.

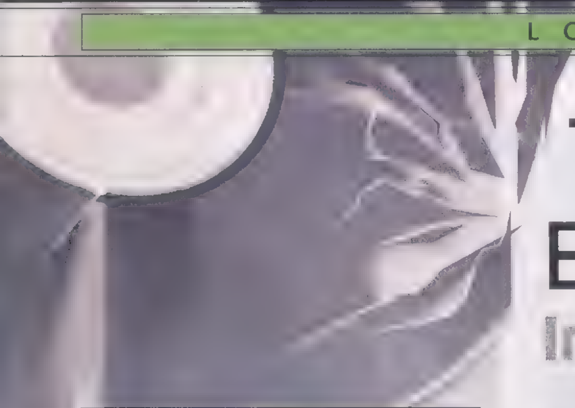
www.redchairsoftware.com

Wibble-Wobble.com Advanced XScaleCtrl ($3.50). Why stop at only overclocking your PC? Now you can overclock your Pocket PC, too. Advanced XScaleCtrl operates within your Control Panel and can twiddle the XScale processor speed down to 100MHz and in some cases up to 500MHz. You control this by using pull-down menus to select settings for the L (Crystal Frequency to Memory Frequency Multiplier), M (Memory Frequency to Run Mode Frequency Multiplier), and N (Run Mode Frequency to Turbo Mode Frequency Multiplier) values. Confused? Don't worry. The site has a chart of settings that will help guide you. For the same price, you can get the basic XScaleCtrl utility, which replaces the L, M, and N options with a simple megahertz slider.

www.wibble-wobble.com/wince/xscalectrl

by William Van Winkle

For additional apps and utilities, see www.cpumag.com/cpudec03/apps.

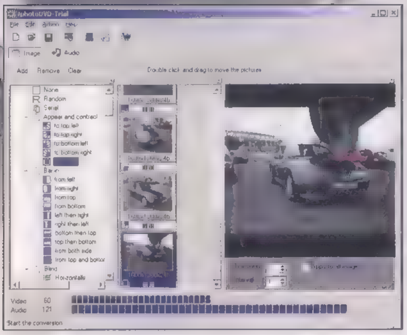


by Warren Ernst

The Bleeding Edge Of Software

Inside The World Of Betas

IphotoDVD 1.08 Beta



Official product name: IphotoDVD
Version # previewed: 1.08 Beta
Publisher: Keronsoft
Developer and URL: Keronsoft; www.keronsoft.com
ETA: Q4 2003
Why you should care: One cool way to distribute digital photos.

Many users think the digital camera is the greatest thing since sliced bread, but these are usually people with computers talking. To share your digital photos with someone without a computer, usually you have to print the photos out. Assuming you even have a nice photo printer, all the photo paper and ink you'll need to print a few dozen digital photos will set you back some cash. That's if you even want to spend the time configuring and babysitting the printing process.

IphotoDVD takes a different approach. The app takes a list of digital photos (in TIFF, JPG, or BMP formats) and converts them into an MPEG file. Your photos will display sequentially, and you can add an MP3 tune as background music to what amounts to a slideshow. Now, take that MPEG and use another program (Nero works fine for this) to make a VCD of your shots. Pop that VCD into almost any DVD player and watch and listen to your slideshow on a television.

IphotoDVD has a very simple interface, and adding photos, selecting from dozens of transition effects, and picking an MP3 are easy. Increasing the time that each photo displays is simple, as is setting the order of the images to display. The only quibble I have is that about half my movies didn't come out right, with colors being inverted like a photo negative. Playing with the encoding settings yielded some success, but I'm still not sure what the magic combination is.

Still, this is why we have betas, and even as is, this version is fun to use. ▲

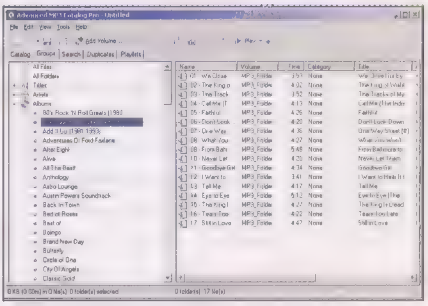
Advanced MP3 Catalog Pro 3.05 RC1

If you only have a few dozen MP3 songs in your library, Windows Explorer is really the only tool you need. If you have a few hundred or thousand, however, you need something more advanced, such as Advanced MP3 Catalog Pro.

AMCP is an MP3 file cataloger that works fast and well. It scans MP3 files stored on local hard drives, network shared drives, and removable media and breaks down the songs' ID3 tags into a searchable internal database. The app also groups songs into categories on the fly, so not only can you search for "Go West," you can also easily see your songs grouped by artist, album, genre, or year.

AMCP also tosses in some useful utilities, including a duplicate-file finder that reduces clutter. There's also a tag-filename editor for quickly renaming a file to match its (correct) tags or to retag a file to match its (correct) name. A master database exporter is for the truly organized who want to make a spreadsheet or database of their library. A Playlist builder uses a clever "draggable hot zone" for making playlists a drag-and-drop affair. To top it off, you can double-click a file to play it in the player you choose, create your own categories, and add comments to songs for later reference.

As beta software, AMCP is top-notch, complete with a professional installer, a complete help file, and no weird crashes or bugs. The nearly $30 cost is a little steep, but sometimes you get what you pay for. ▲



Official product name: Advanced MP3 Catalog Pro
Version # previewed: 3.05 RC1
Publisher: Wizetech Software
Developer and URL: Wizetech Software; www.wizetech.com
ETA: Q4 2003
Why you should care: A great way to get through that huge MP3 library.

For more betas, go to www.cpumag.com/cpudec03/betas.

Send Us Your Betas: Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-round. Send your prospects to bleedingedge@cpumag.com.

UP TO SPEED

Upgrades That'll Keep You Humming Along

Another month, another collection of software and driver updates for your consideration from the likes of ATI, NVIDIA, Microsoft, SnapStream, and others.

Updates

ATI Multimedia Center 8.7

Coinciding with the Catalyst 3.8 drivers' launch (see the Driver Bay section), this update for All-In-Wonder Radeon cards adds support for European Teletext TV information service in the EazyLook interface. Users can integrate their account at Fast TVTV to browse and schedule recordings from the service's TV grid. The MultiView adds picture-in-picture support within EazyLook for the AIW 9600, 9700, and 9800 series cards.

Get it at: www.ati.com

HyperSnap-DX 5.30.01

This venerable screen-capture utility went to version 5.30 recently, followed quickly by a minor tweak. The major update adds the ability to turn font smoothing off during a capture (required by some print publishers) and an option to capture only the mouse cursor. The .01 refresh corrects auto scrolling in Opera 7.20.

Get it at: www.hypersnap-dx.com

HyperTransport Analyzer 1.0

This diagnostic utility for all AMD64-based systems analyzes the upstream and downstream bus width and frequency of the HyperTransport link between the CPU and chipset.

Get it at: www.viaarena.com

Microsoft Windows XP Media Center Edition 2004

The second iteration of MCE adds FM radio time-shifting support, more robust music visualizations, 16:9 display ratio support for making the most of HDTV screens, on-screen phone call notification and caller ID, and Teletext TV support for European markets. The OS ships only with new Media Center PCs, but owners of the original models can upgrade to MCE 2004 through the hardware retailer. (See our review in next month's issue.)

Get it at: www.microsoft.com

News Rover 9

This version of the flexible Usenet reader adds multiple download connections that accelerate binary downloads, support for the latest popular forms of compression and file segmentation, support for multiple email accounts, and performance improvements.

Get it at: www.newsrover.com

RAM Idle LE 1.4

This latest free version of the memory manager from TweakNow attempts to optimize free system RAM for better performance. It sits in the System Tray, giving a numerical readout of your free memory levels at all times.

Get it at: www.tweaknow.com

SnapStream Personal Video Station 3.3

This software lets you watch, record, and time-shift TV programming on your PC and then play it back on multiple devices. This version allows for recompressing and playing back files in DivX, variable bit rate recording, better de-interlacing, and support for Windows Mobile 2003 for Pocket PC. (See our review on page 89.)

Get it at: www.snapstream.com

Driver Bay

AMD Athlon 64 Processor Driver For Windows XP 5.2.3790.2

The most up-to-date driver for installing WinXP on Athlon 64-based PCs. Versions are available for supporting installations in most major languages.

Get it at: www.amd.com

ATI Radeon Catalyst 3.8

ATI calls this "the most significant software update in the company's history." The new Catalyst adds dynamic overclocking for Radeon 9800 XT cards. The new VPU Recover helps the video driver recover from hardware hangs, while SmartShader claims to add shader effects to older games. ATI is now promising 12 Windows driver updates a year for its cards and six updates annually for Linux drivers.

Get it at: www.ati.com

NVIDIA WHQL Personal Cinema Driver 45.33

The first WHQL release for the Personal Cinema GeForce FX line, this bundle incorporates the WDM drivers for VIVO support and the general display drivers. It also includes the nView 2.0 multidisplay tool and NVKeystone (adjusting for projected images) and Digital Vibrance Control 3.0 for tweaking color and brightness.

Get it at: www.nvidia.com

ViewSonic Plug And Play Drivers

Signed drivers for the ViewSonic and Optiquest monitor line and separate downloads for WinXP/2000/Me. Unsigned drivers are also available for Win98.

Get it at: www.viewsonic.com

Windows Internet Explorer 6 Service Pack Cumulative Patch

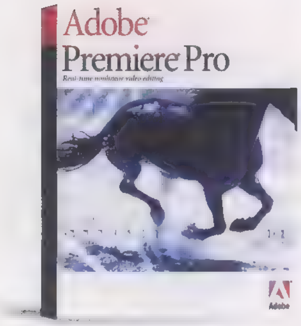
This critical security patch for IE6 (with SP1 applied) plugs a hole that IE6 makes in all Windows versions, even if you don't use the browser. The hole gives intruders the ability to run programs on your PC.

Get it at: www.microsoft.com

by Steve Smith

Adobe Premiere Pro

One Hard-To-Beat Video Editor

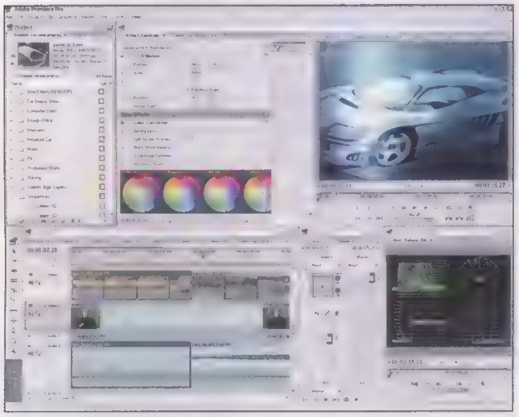


Premiere Pro
$699; $149 (upgrade)
Adobe
www.adobe.com

Premiere Pro is the latest and greatest version of Adobe's high-end nonlinear video-editing application. Pro provides improved performance over past versions and includes many new features befitting a professional editing system, bringing it up to par with such competition as Final Cut Pro and MediaStudio Pro.

New features include multiple nested timelines, three-point color correction, and improved support for sound mixing and output. The most obvious change may be the editing interface. The timeline system, in which scene transitions and other effects are cued, has moved from traditional A/B editing to single-track editing, which is generally described as more powerful but trickier to learn. You can now create multiple timelines (called Sequences) in a project and then nest them. This lets you assemble each scene with its own timeline and merge the timelines to create the full movie. As you transfer video to Pro, a new Scene Detection feature breaks scenes into clips at their natural borders. This isn't new, but it's new to Pro, and it can save you time.

There's also improved color support. The native YUV format processing retains color information from digital video input sources. Three-point color correction lets you correct for exposure and color-balance problems and even replace one color with another throughout a clip. In addition, simple white-balancing tools are available for speedy color correction by beginners; you can set the white balance by simply selecting white, black, and gray points.



Adobe Premiere Pro in action.

Video and audio tracks are now resizable, so you can view video clips and audio samples with any amount of granularity, down to single frames or samples. New audio controls include Sample-level Editing, which lets you precisely edit audio, removing "pops" as short as 1/96,000th of a second. You can also manage multichannel audio for surround sound. Pro includes 17 audio plug-ins, including Equalization and Reverb effects. In addition, Pro supports 5.1-channel surround sound mixing without the need for plug-ins or third-party software.

Support for Motion Paths (moving an object, such as text) is also improved. You can animate a clip by positioning it over another clip and setting key frames that the clip will follow. Ease In and Ease Out transitions allow for smoother timing of Motion Path effects, and you can change the clip's size, opacity, cropping, and position.

With a powerful enough PC, you can often see clips, transitions, color corrections, and so on immediately without waiting for Pro to render the images. Rendering is required to build the final output, but it's a one-shot deal. Adobe recommends a 3GHz or faster Pentium system (800MHz processor minimum).

Pro requires Windows XP Home or Pro, is optimized for Pentium systems, and includes multiprocessor and Hyper-Threading support. I tested using an Athlon XP 3000+, and Pro was still speedy. I transferred home video using a video-capture card and also imported some World War II-era ephemeral films in MPEG-2 that I downloaded from Archive.org. (The app did balk at MPEG-4 files from the same site.) After remixing a film, I burned it to a DVD-R. The process was smooth, the program was stable, and the results, while less than spectacular, could have been impressive under the control of someone with actual video-editing talent.

Pro can also import MPEG-1 and MPEG-2, AVI, QuickTime, and other common formats; export to AAF (Advanced Authoring Format), which you can then import to other apps; and burn projects directly to DVD and VCD, but it's not a DVD-authoring tool. (You'll need an app such as Adobe Encore DVD for that.)

The app is available on CD or as a 277MB download. It integrates well with Adobe's other software, letting you easily export a project to Encore DVD for authoring or import Photoshop files.

Pro isn't the best choice for beginners. More experienced users will need some transitioning to Pro, but it should definitely be worthwhile. ▲

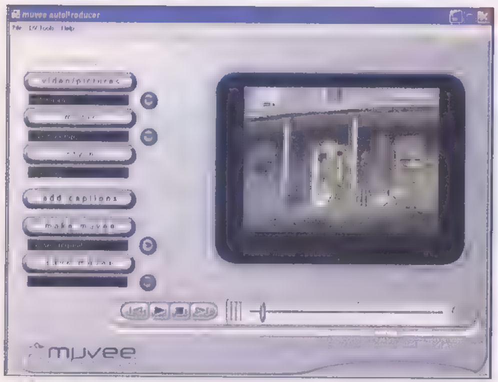
by Kevin Savetz

For more on Premiere Pro, go to www.cpumag.com/cpudec03/premiere

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

muvee Technologies autoProducer 3.0

Home Movies On The Quick



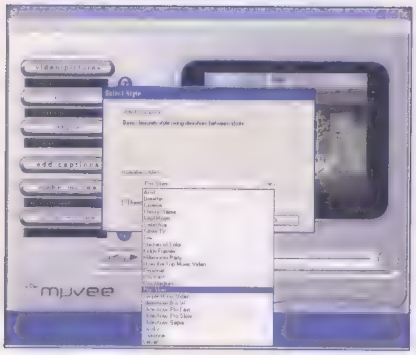
autoProducer 3.0
$49.95
muvee Technologies
www.muvee.com

CPU CPU CPU CPU

Editing home videos isn't usually a quick task. Even the easiest video-editing program can doom you to hours of nipping, tucking, and trimming before you turn your raw footage into something watchable. Enter muvee autoProducer, the Roomba of the home-video world.

Muvee takes a block of video or handful of still shots, adds a soundtrack, and applies one of 24 styles to create a somewhat randomized, always entertaining little film. Moving from raw video to a polished muvee can take as few as 10 clicks. Don't like what you get? Ask muvee to juggle the video again and you'll have a different assemblage in seconds. We generated more than a dozen slightly different muvees from the same video, audio, and style settings.

The style you choose controls the transitions and effects in your instant masterpiece. The Cinema style boiled down 15 minutes of meandering around our neighborhood into a coherent highlight reel. The Classic Sepia style added an aged-film effect to evoke a heart-tugging love for the old homestead.



Muvee's 24 styles allow for some flexibility, but we're waiting for the one that can turn our video into a badly dubbed kung fu movie.

Muvee's half-dozen most prosaic styles are brilliant at targeting the most interesting parts of your video, letting you decide on the pace of the film and whether to keep the video's sequence intact. The app's four slideshow styles jazz up collections of stills with pans, zooms, and well-timed cuts. Other styles are pretty gimmicky; Detective, for instance, zooms crosshairs onto your video clips. If the 24 built-in styles aren't enough, you can buy additional packs of 12 styles from muvee for $19.95.

The software cuts your film to the beat of the soundtrack you choose, so the same raw video becomes jaunty or contemplative depending on the contents of your MP3 collection. You can also use the audio you taped with your movie, but many of muvee's styles reduce sync-sound to incoherence.

Muvee is also blindingly fast. It analyzed our 15 minutes of video in less than a minute on an Athlon XP 2400+ system, and each attempt to create a muvee took only a few seconds. Exporting a three-minute muvee to DVD-quality MPEG-2 took about 12 minutes.

Behind muvee's simple user interface is a healthy amount of artificial intelligence. The program's algorithms analyze the motion and content of your video, trimming out dull or poorly shot parts and looking for the most relevant information. If you choose the Personal style, for instance, it zooms in on faces.

The program takes in and puts out a healthy range of video formats. You can import DV-AVI, AVI, MPEG-1, or MPEG-2 video. You can also import MP3, WAV, or WMA audio and pour out MPEG-1, MPEG-2, WMV, and AVI with pretty good control over your output settings. The app includes a rudimentary DV capture plug-in, but we suggest you use a "real" video-editing program to capture your material and trim the beginning and end before feeding it to muvee, as you can't do any trimming within muvee. You'll also need a separate burning program if you want to put your muvee on a disc.

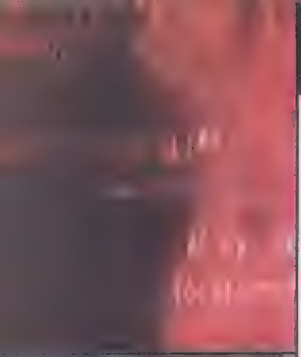
Don't try muvee on video that you didn't record yourself or on anything with a plot unless you want to see some pretty weird results. Turning a 10-minute chunk of a television program into a three-minute muvee resulted in something like those "Last week on . . ." segments that often appear at the beginning of shows. You can set muvee to edit your video sequentially (rather than breaking it into reordered fragments), and you can insist that it include a certain scene (through a kludge involving using another video editor). However, you can't exert the strict control over your muvees that you would need to keep the plot intact.

A few other programs do this kind of auto editing, including Roxio VideoWave Movie Creator and Microsoft Windows Movie Maker 2. But we found muvee to offer more styles and make more intelligent choices than either of those programs' autoediting functions.

Muvee will never replace your main video-editing application, but it will boil your library of unviewed home movies down into some great popcorn material. And that's well worth the price. ▲

by Sascha Segan

CPU Ranking: 0 = Absolutely Worthless CPU CPU 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect



by Chris Pirillo

Lookout 2003

Microsoft's PR team will tell you that the new version of Office is better than its predecessors (and the competition). I, however, will tell you that Outlook 2003 is riddled with so many conceptual holes and user-interface flaws that it doesn't make a very compelling upgrade for those of us who have been "stuck" with Outlook 2000. (Don't even get me started on the bug-riddled Outlook XP; its tandem POP3 seizures made it impossible to use for those of us who access more than one email account regularly.)

Back to the future, er, the present. For this world, there's no better electronic personal information manager for the Windows platform. I don't see this particular "vertical monopoly" changing anytime soon, unfortunately. Mind you, I'm not necessarily concerned with the folks chained to their desks in cubicle hell. I live inside my PIM, literally. Outlook 2003 is garish and, despite the overdue implementation of high-color icons, is rough 'round the edges to the nth degree. Where did Microsoft screw up? Let me count the ways.

Where did Microsoft screw up? Let me count the ways.

1. What's up with this stupid dark-gray gutter around the Reading Pane? Honestly, I find it more annoying than attractive. Not all of us are blessed with Desktop real estate to spare. It's useless and unchangeable.

2. Someone decided it would be cute to use Arial (instead of the Office-standard Tahoma) for the header information displayed in the Reading Pane. There's no way to change this formatting. Whichever committee decided this should be disbanded and sent to the far reaches of the globe.

3. I thought I could live without the header information in the Reading Pane, so I turned it off. For a brief moment, all was right with the world. That silly gray divider was even gone! Until, that is, I previewed a message that contained an attachment. Then, it came back permanently—even in message windows that previously didn't display the gray line. I'd animate the quirk for you in person, but this is a magazine.

4. Even after fumbling through the custom view organizer, there appears no way to change the way folders/subfolders appear en masse. I very much dislike the new default data layout, with grid lines, flags, and group sorting. Thank you for stealing hours from my life.

5. You're forced to turn on the Remove Extra Line Breaks In Plain Text Messages option. How? If you don't, all your replies will be dorked up beyond belief. And don't bother with setting a higher word wrap number, as that seems to have little influence over this feature. Whatever.

6. In the Folder List in the Navigation Pane, you can't remove the noncustomizable "bonus" hyperlinks. If I want to view my folder sizes or manage my data file(s), I will look elsewhere. Thanks for eliminating even more usable screen space.

7. Minus the inexcusable padding, the Reading Pane in a Tasks folder is as it should be everywhere. See how clean it looks? Nice. Too bad someone didn't give us the ability to implement these settings in other folders. Wait, let me guess? You spent billions of dollars on usability studies? Next time, try using human beings instead of lab rats.

8. Seeing how this client revision relies heavily on the new, dockable Tasks Pane, why is there still a completely separate Reminders window? Incongruence, typical of the oversights I keep finding throughout this beast.

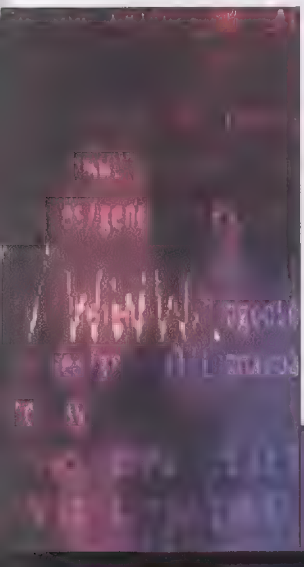
9. Microsoft assumes we operate in the Department of Redundancy Department. The message fields are completely informative and unobtrusive, yet we're forced to read that, "This Message Was Sent With High Importance" in the Reading Pane. Wow, is that what that red exclamation icon means? Why don't you let us choose where and when we view this kind of information? Likewise, when I reply to a message, I don't need to be reminded, "This Message Will Be Sent Via [Account]." Duh! I'm not complaining that you provide this outright, I'm complaining because you won't let me turn it off.

Right now, I'm actively seeking an Outlook programmer who can help me develop a TweakUI utility to work around these issues. If you know of anyone, please, let him know the world needs his services. ■

You can dialogue with Chris at chris@cpumag.com.

Holiday Wish List

1. *Nomad Jukebox Zen 2.0 60GB*
2. *Sony CLIE PEG-UX50*
3. *Atech Flash PRO USB 2.0 9 In 1 Reader*
4. *Canon PowerShot G5*
5. *Samsung SyncMaster 213T*
6. *ATI Radeon 9800 XT*
7. *IntelliMouse Explorer 4.0*
8. *Linksys Wireless-G Router*
9. *IBM ThinkPad R40*
10. *A living, breathing Doozer*



by Pete Loshin

Free Software & Freedom

The new year is a good time to be thankful. In the United States, we have our political liberties, even if it's easy to ignore the political aspects of free software and assume there'll always be someone willing to write it.

The biggest free-software story this year was SCO's legal jihad against Linux. The company formerly known as Caldera (as in "Caldera Linux") now claims that somewhere within the Linux kernel is code improperly taken from the original Unix kernel, which SCO owns. Which code? It won't say. SCO is using the legal system to spread FUD and extort license fees from nervous Linux users.

Microsoft sure is an interesting company. How can software selling for hundreds of dollars in the United States sell profitably elsewhere for $40? That's what happened when Thailand announced a $250 "people's PC" running Linux. Windows and Office at retail prices could have tripled the price, so what a pleasant surprise when Microsoft announced it would deliver Thai versions for $40. Golly, I can't wait for those discounts to make it to the states.

Which reminds me of the recent "we'll show you ours" sessions Microsoft has been holding for Chinese experts to examine Windows source code. China is the world's biggest undeveloped market—a hotbed of intellectual property piracy and a growing center of free software use and development. Is China checking out Microsoft's goodies to make sure there are no CIA backdoors or to make sure it can put its own backdoors in?

According to the CIA's "The World Factbook," Chinese per capita GDP in 2002 was about $4,400. (Thailand's was $6,900.) I predict in 2004 Microsoft will discover it can sell Chinese versions of Windows and Office for less than $40, too.

Security and proprietary code may mix, but not well. Speaking out on how Windows-only networks represent a serious security threat cost Dan Geer his job after he co-authored the "CyberInsecurity: The Cost of Monopoly" report. Read it (download and print it, just in case it disappears) at www.ccianet.org/papers/cyberinsecurity.pd.

To oversimplify, Geer and others state that a monoculture (the global network of Windows nodes, for example) is susceptible to massive failure whenever a successful attack is launched. In other words, if you have wall-to-wall sheep on a ranch the size of Texas, when anthrax breaks out, you'll have wall-to-wall dead sheep, which not only isn't good for the sheep, it's bad for anyone within smelling distance.

Microsoft is a big customer of Geer's former employer, @stake. He got the boot. Geer is a star so he won't be out of work long, but what if you're Joe Sysadmin? Are you going to risk it all to tell your boss that Windows-only isn't just bad policy, it's a huge security risk?

Finally, since 2000 we've discovered that it's not just a matter of going to the polls on Election Day and pulling a lever, punching a card, or marking a circle to have your vote count. Now the digital voting machine industry wants to sell us billions of dollars worth of direct-recording-electronic voting systems running Windows (of course) that leave no auditable records, that use secret software to tally votes, and that can be tampered with undetectably.

> **The biggest free-software story this year was SCO's legal jihad against Linux.**

Surely it makes sense to give voters a printed receipt to verify their votes were cast (and recorded) properly. How much extra could it cost, and how much is it worth to citizens to know votes are tallied correctly? It makes business sense to keep track of every nickel, dime, and dollar spent in a donut shop or drug store, which is why we get those nice printed receipts every time we buy something. So why not when we vote? Whatever the cost, I'd consider it's well spent, far more so than [insert your favorite partisan boondoggle here].

For more about digital voting, check out the Web site of Bev Harris, author of "Black Box Voting: Ballot-tampering in the 21st Century" at www.blackboxvoting.com. This is for real, and it's the kind of thing one might expect from "democratically" elected leaders like Saddam Hussein who won his last election with 100% of the vote.

Next month I'll get off the soapbox and back to cool hacks for open-source stuff. ■

Get saucy with Pete at pete@cpumag.com.

Holiday Wish List

1. *I'm still waiting for the (blue) Passat I asked for last year.*
2. *For the second year in a row, peace on earth. What's the holdup here?*
3. *Universal health insurance.*
4. *Let's fix the schools and pay teachers a living wage.*
5. *Hook up all politicians and pundits to lie detectors whenever they speak publicly.*
6. *A traffic light at the six-way intersection on Park Avenue in Arlington, Mass.*
7. *Freedom from hate.*
8. *Freedom from fear.*
9. *Freedom from want.*
10. *A few more clients for my Linux-transition consulting practice (Internet-Standard.com).*

EDITOR'S CHOICE

"The Vector VX is a testament to Velocity Micro's ability to put together a quality rig; this machine is not only the fastest of the three tested, it's also the most stable." **June 2003**

TAKES OTHER COMPUTERS'
MILK MONEY.

AMD® Athlon™ 64 FX-51 Processor

Thermaltake™ CPU Heatsink & Cooling System

DX Black & Silver Case Full Tower with front USB 2.0

ASUS® SK8N® Motherboard with nForce™ 3 Pro Chipset with Dual Channel DDR

1024MB Corsair™ PC3200 DDR 400, Reg ECC

256MB ATI® Radeon™ 9800 XT, Dual Heads, 8x AGP

120GB Western Digital® 7200rpm SATA Hard Drive, 8MB Cache

3 Year Warranty with 1 year 24/7 & On-Site Support

Black 16x/48x Lite On® DVD-ROM

Black 52x/24x/52x Lite On® CD-RW

Black 1.44MB Floppy Drive

10/100MBps Ethernet Network Adapter

Microsoft® Windows® XP Home w/SP 1 and CD

Black Microsoft® Multimedia Keyboard

SoundBlaster® Audigy2 w/ FireWire Port 6.1 Channel

Charcoal and Silver Microsoft® Explorer Optical USB Scroll Mouse

$2695

GAMER'S EDGE™ 64

Get FREE shipping when you order by December 10, 2003 and enter promo code CGW-001.
www.velocitymicro.com
1-800-303-7866

If you're looking for power, you've come to right place. Velocity Micro combines kick-butt power with top-notch performance to deliver the best computers on the market. Like our Gamer's Edge. Constructed of the highest-grade premium components, it's painstakingly assembled, rigorously tested, and backed by our three-year warranty. No wonder our customer satisfaction rating is so high. Hey, it's a tough world. Make sure you're packing the right equipment. Call 1-800-303-7866 or visit velocitymicro.com today.

VELOCITY micro
When performance counts.™

© 2003 Velocity Micro Inc., Richmond, VA. Velocity Micro and Gamer's Edge are trademarks of Velocity Micro, Inc. All other trademarks are the property of their respective owners and hereby acknowledged.

BEST of FRINGE

by Michael Sweet

Wake up, readers; this is not your usual Fringe column. In fact, this is the very last episode of Fringe ever. Apparently, Samit would rather use this space for Microsoft promotional articles and Clearasil ads. FINE! But we're going out with a bang. We gathered up the coolest Fringe pieces from issues past and squeezed them into a final Best of Fringe edition. Meanwhile, we're off to Aruba.

Words From The Web

YEAH, THEY *ACTUALLY* SAID THIS . . .

BEST FRINGE QUOTES

June 2002

From an MSN celebrity chat with Jack Black, upon being asked how he balances his acting and singing careers:

"It all gets mooshed into one entertainment burrito."

With extra cheese.

June 2002

From a Jolt.com message board about jobs:

"Burger King sux. S*ty pay and at the end you smell like onions. And if you're caught high YOU GET FIRED!"**

Apparently you can't always have it your way, even at Burger King!

September 2002

From an MSN 20s chat room:

"I guess to have an intelligent conversation, we have to be more precise. Define 'snot.' "

All conversations should begin this way.

January 2003

From a starwars.com message board regarding the first thing Anakin Skywalker will say when he becomes Darth Vader:

"I can't see a thing in this helmet!!"

The farce is strong in this one.

August 2003

From an MSN chat with Kelly Osbourne, regarding her preconcert rituals:

"They lock me in my dressing room because I'll just wander off."

Like father, like daughter.

Infinite Loop

R360 Gets An F

Astronomers recently monitored a black hole that's causing sound waves in the middle of the Perseus galaxy. They calculated that the hole's frequency would be the musical note B flat, 57 octaves below middle C on a piano. Here are a few notes your computer might be singing.

3.06GHz Pentium 4: F sharp

2.2GHz (3200+) Athlon 64 FX-51: C

2.0GHz Power Mac G5: A sharp

400MHz DDR: G

730MHz ATI Radeon 9800 Pro XT memory speed: F

Sources: CNN; www.deepsound.net/calculs.html

BEST FRINGE SITES

August 2003

Homestar Runner

Chillin' with Homestar Runner and the gang is easy-going fun.

www.homestarrunner.com

July 2003

We still love the Iraqi Information Minister.

www.welovetheiraqiinformationminister.com

October 2002

> "It seemed that the man in question was somehow defying logic and carrying his entire hind-quarters above the rim of his pants."

We shamelessly lifted this quote from a letter by Douglas Cooper to Levi Jeans. Douglas Cooper (who, as he likes to point out, is an electrical engineer) writes letters, lots of them, to various companies with suggestions for new products or improvements to existing products. Read his eyebrow-raising missives at

www.theretort.com/theletters.html

August 2002

Love Triumphs Over Wall

Find your next sugar daddy at

WriteAPrisoner.com

September 2002

The Prodigal Puppet

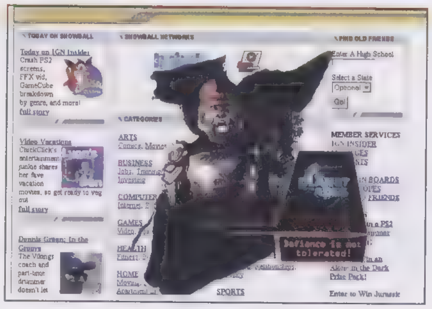
Last time we saw the Pets.com Sock Puppet, he was lying in his own filth and left for dead in the dot-com wasteland of a 2001 E*TRADE Super Bowl commercial. The demise of the Pets.com mascot was a fall from grace so complete and swift in its devastation that even Robert Downey Jr. could laugh at the poor puppet without feeling a twinge of irony. But, like Downey Jr., the Sock Puppet has been given another chance. Automotive credit marketing company 1-800-BAR NONE bought the rights to the Sock Puppet, who will now be shilling car loans to people whose credit rating is worse than Enron's.

www.barnone.com

All Singing, All Dancing

Eyeblaster's Ads Of The Future

Sure, we all like to *say* we dislike intrusive Internet advertising. After all, how many Orbitz pop-under pitches can our desktops hold? But every once in awhile, Spider-Man swings across the home page of our favorite site, followed by that orange Cingular asterisk, and we forget (or at least forgive) that someone is pitching us yet another mobile service. Or perhaps we're surfing a games site, and suddenly the large shadow of a pterodactyl makes a few noisy predatory passes across our window before a "Jurassic Park" logo settles into an ad slot on the page. By the time we realize that it's just Spielberg hawking another sorry sequel, we've already been amazed and amused by the technical creativity that pulled off such a feat. It's almost a pleasure to be conned this well into noticing an advertiser.



One of the earliest but more memorable Eyeblaster floating-unit ads had a thuggish simian from "Planet of the Apes" break through the front page of IGN.com and command viewers to kneel in submission.

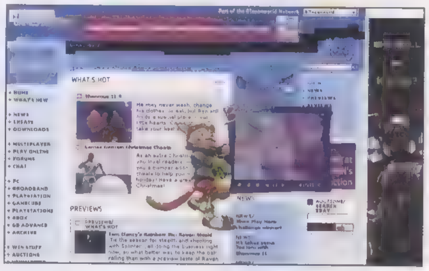
Welcome to the next stage of online advertising: in-your-face sales pitches that are as fun as they are intrusive. In order to convince advertisers to return to the Internet after the severe ad revenue depression of the post-bubble years, publishers and ad technology companies have had to go way beyond the banners that few of us ever noticed anyway. Bigger, rich-media ad units of all shapes and sizes are all the rage this year, but none of these formats has been as consistently memorable as those walking, talking "floater ads" that have made one company, Eyeblaster (www.eyeblaster.com), one of the major success stories of the post-bubble Internet.

"The level of the creative is really essential," says Amir Hardoof, VP Client Services of Eyeblaster, the company that provides the technology behind some of the Web's most assertive and memorable advertising. "You can have a really big ad that is so entertaining it will get noticed." And while most Internet surfers resent having windows pop up unexpectedly or even animated figures sing and dance across their screens, "you can turn that around by doing good creative," says Hardoof. Web users seem to be saying, sure we'll loan you a slice of our attention span, so long as you entertain us in the process.

Although Eyeblaster itself does not design ads, it provides the platform and technology that make these innovative spots possible for ad agencies, such as Atmosphere BBDO (for Cingular), DDB Entertainment (Jurassic Park), and scores of others. The Eyeblaster Rich Media Platform, now in version 5.3, is an ad serving and tracking system used by over 400 agencies and 1,000 major sites and networks. When other online ad companies were closing shop in 2001 and 2002 and publishers went bankrupt for lack of ad revenues, Eyeblaster was just ramping up. "Since our first rich-media campaigns in early 2001, our growth has been explosive," says Gal Trifon, CEO. "Our ad impression volume grew over 800% in 2002 and will more than double in 2003."

Common Tech, Uncommonly Executed

But how does Eyeblaster make stuff fly across Yahoo!'s home page or get a nasty-looking simian from "Planet of the Apes" to literally rip through the front page of IGN.com? Actually, the technology itself is commonplace. "Agencies create some Flash assets using standard Flash, and they take these files and upload them into the system, and in the system they create ads," says Hardoof. And that cool ability to superimpose animations and effects on top of most major Web site pages is a simple function of Flash itself. "Flash by nature is transparent, so you can create transparencies in Flash easily."



In order to preserve the user experience at a site as much as possible, the Eyeblaster ad serving system uses "polite" downloading of ad data and built-in bandwidth detection to allow Flash ads with embedded streaming media.

In fact, one of the reasons Eyeblaster has proven such a hit with agencies and clients is ease of use. What looks like a complex trick on-screen is actually the product of a heavily automated process that is very straightforward for the agencies and publishers who maintain accounts on the Eyeblaster Rich Media Platform. Using a Web-based interface, the agency goes into the system and simply uploads the Flash assets and tells the system how to run the animations. The agency then positions where the ad should appear on the page by designating a starting point on the X and Y axes, whether it should follow a user's scrolling or not, and how long the animation should appear. The Eyeblaster system then lets an agency rep type in any URL to preview how the ad will appear on any live Web page to see whether that flying pterodactyl or swinging Spidey merges well with a target site's design.

The Eyeblaster platform also maintains a database of the hundreds of publishers who can run its ads. Once an agency has negotiated with a site such as Yahoo! or MSN to run an Eyeblaster ad, it can go into the system and assign the ad a "flight," where and when the ad will run. The system lets the agency submit the ad for final approval by the publisher. Once the agency and publisher approve the final form of the ad, the Eyeblaster system converts the rich-media Flash creative, as well as all of the embedded commands for its behavior into JavaScript and a small piece of HTML code that publishers cut and paste into the targeted Web page. "Once the Web site puts the code on its page, the code makes a call to the Eyeblaster servers," says Hardoof. "The code tells the server to deliver the specific JavaScript that was generated for that ad."

In addition to the floating ad, Eyeblaster deploys many types of rich media, including banner ads that expand onto a page, wallpaper ads that seem to decorate all of the background white space of a page, and full-screen commercials. Many Eyeblaster treatments are composed of multiple Flash units. A typical floating ad will have an introductory animation that leaves the page after a few seconds and another "reminder ad" that remains on the host page.

Well-Mannered Advertising?

Compared to just about every offline ad platform, online advertising is monstrously complex. Ads need to be served from companies such as Eyeblaster to a wide variety of sites, all with different technical specs and requirements. Likewise, these ads have to arrive on desktops that plug into the Web at different bandwidths and display pages at different resolutions and in a variety of browsers. The inherent interactivity of the Internet also lets advertisers introduce even more complexity into the process by measuring how many people click an ad, how they interact with buttons within a unit, where they mouse over, or how long they keep an animated presentation open.

Most Eyeblaster rich-media formats can be as large as 100KB, so a critical part of the system is ensuring that the ads do not add a prohibitive overhead to publishers' pages. Eyeblaster uses what it calls a "polite" loading system. When a publisher site makes a call to the Eyeblaster server, the platform loads only 1KB of initial code and then

Blasting The Big Brands Online

Founded in 1999, Eyeblaster worked on its technology for two years before serving its first floating ad (for the film "Moulin Rouge") in 2001. According to CEO Gal Trifon, his company quickly became a darling of the Web ad industry because it attracted some of the big brands that had been avoiding the medium for years.

CPU: What companies or brands are the biggest users of the formats?

Trifon: Entertainment, automotive, and technology were among the first categories to adopt the technology. We now run over 300 advertising campaigns a month for every category, including consumer package goods, financial services, pharmaceuticals, and travel. The list of companies is a virtual who's who of *Fortune* 500 companies, including Coca-Cola, General Motors, McDonald's, Verizon, and American Express.

On the publisher side, most of the ad-supported Web sites in each category, including the big portals [such as] Yahoo!, AOL, and MSN; the leading news, financial, entertainment, and music sites; and sports and kids sites, support and widely use the technology.

CPU: What distinguishes an intrusive ad that people resent from an entertaining one that people respond to online?

Trifon: Ads are intrusive by nature; good creative is worthless if it's not attention grabbing. The same rules that apply to determining whether creative is "good" or "bad" in the offline world exist on the Web. The Web provides better tools to control the environment in which an ad appears. Regardless of creative quality, advertisers need to consider frequency capping (how often is the user exposed to the same message), targeting (how relevant is the message to the specific user's interests and needs), and even the technical capabilities of each user to optimize performance.

CPU: What part of your business is the fastest growing and why?

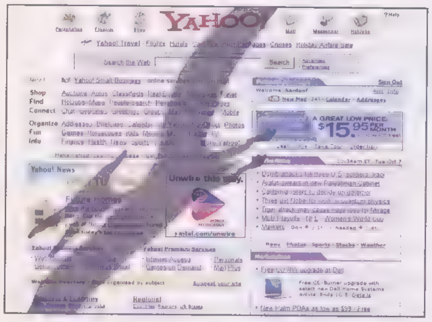
Trifon: Demand for our large file size banner formats, polite banners, and expandable banners is incredible. The reasons are inventory availability on the publishers' side, exceptional creative flexibility for the advertisers, and the fact that this is an easier, more affordable first step for first-time rich-media advertisers.

CPU: Is the Eyeblaster format going to "pop up" on media other than the Web?

Trifon: Eyeblaster's strategy is to leverage the wide adoption of the platform to introduce new marketing capabilities to new and existing customers. Applications such as rich-media messaging for iTV and mobile devices are in our product plans for the next few years.

CPU: Is Eyeblaster profitable? If so, what are the principle revenue streams driving profitability? If not, what will it take to go profitable?

Trifon: The company has been profitable since December 2001 and has been cash flow positive since March 2002, which is outstanding for such a young technology company. Profit margins are improving for us and along with our fast revenue growth, we are very happy with the results so far. Our ASP product, the Eyeblaster Rich Media Platform, is our No. 1 revenue source that is now joined by new opportunities. As with other businesses, keeping our cost of goods and operational costs in control is key to our success. ▲



From within the Eyeblaster platform, an ad agency can test its floating-ad unit on any live URL. Here, the "Jurassic Park" pterodactyl swoops across the current day's Yahoo! home page.

waits for the publisher's page to load on the user's browser completely before executing the rest of the Flash download. In the first few kilobytes of the download, Eyeblaster is not only serving but conversing, retrieving specs from the end user's browser to determine its capabilities, the browser type, and screen resolution so that it can adjust how the ad is played accordingly.

Because of this ability to manage the user experience, Eyeblaster's newest ad unit, the "polite banner," has proven to be especially popular with advertisers. In this format, a standard, low-res banner loads quickly along with the publisher's page, but once the page is on the browser, the banner comes to life and is replaced by an animated rich-media unit from Eyeblaster. About 30% of Eyeblaster's business now comes from these supercharged "in-page" units.

Keeping the customer happy. Managing bandwidth is critical to rich media because sluggish performance angers both publishers running the ads and end users. If the user's browser has not viewed an Eyeblaster unit before, the system does a bandwidth check. "We load a small 2KB to 3KB test file, and we time how long it takes to download. We calculate the bandwidth and rewrite that to a cookie on the user's machine, and the next time we use the cookie to determine high or low bandwidth," says Hardoof. Advertisers can load low-bandwidth versions of their ads into the Eyeblaster system to serve up when a dial-up user is detected.

Hard as it may be for some Web users to believe, many (not all) advertisers and publishers online are hypersensitive about irritating users with ads because they know that ultimately this ill will rubs off on the site and the product being advertised. Balancing noticeability against annoyance is the trick everyone in this business wants to master. For instance, Eyeblaster has learned from user testing to recommend a 10-second duration limit on its most intrusive ads. Aside from "overlay units," which can write across the entire Web page, the system also limits the floating units to 300 pixels by 500 pixels of screen space.

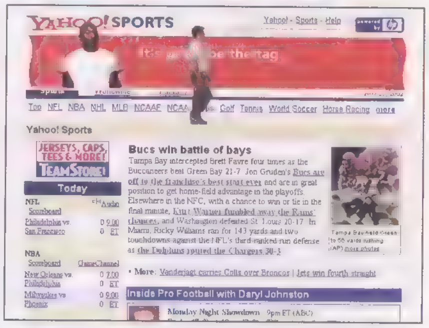
Audio remains controversial, both inside and outside the industry. Many publishers balk at forcing sounds onto their users' screens, but more advertisers are insisting upon audio tracks to ensure a user's attention. In the end, Eyeblaster has discovered that whatever the actual intrusiveness of an ad, the best way to minimize user annoyance is to manage frequency. "You might get very intrusive ads, but if you see it only once a day, it won't be a huge problem," says Hardoof. "Sites with huge ad inventories can use frequency caps," which ensures that a cookied user only sees an elaborate ad unit once a day or a limited number of times over the course of its run on a site.

Smarter, Too

Eyeblaster ads come at a premium, of course. The company charges the publishers running the ads $5 per thousand served impressions, which the publishers usually pass on to the agency buying the ad space. But agencies and publishers have flocked to rich-media ads generally and to Eyeblaster units in particular because the effectiveness of these novel, TV-like pitches are irrefutable. "It's very typical that we see floating units perform 20 times better than a banner," says Hardoof. While industry averages for static banner ads have plummeted to .3% to .4% click-throughs, Eyeblaster floating ads get between 5% and 7% of viewers to click, and even higher rates in categories such as movie or game products. More importantly, rich-media ads are helping to move agencies away from the simple click-through as a way of measuring ad effectiveness and instead looking at how users interact with an ad, how long they view it before closing it, which buttons or options within an interactive Flash ad a viewer uses, and how an ad may change a viewer's perception of a brand.

Does all this mean online ads are destined to become bigger, longer, and louder? In part, yes. Eyeblaster's recent version 5.3 revision now handles file sizes up to 1MB and integrates Flash MX code, which is letting early client AOL UK run streaming video ads in or over content. As the number of broadband users grows, advertisers and publishers are looking for ways to make some Web ads look like TV spots.

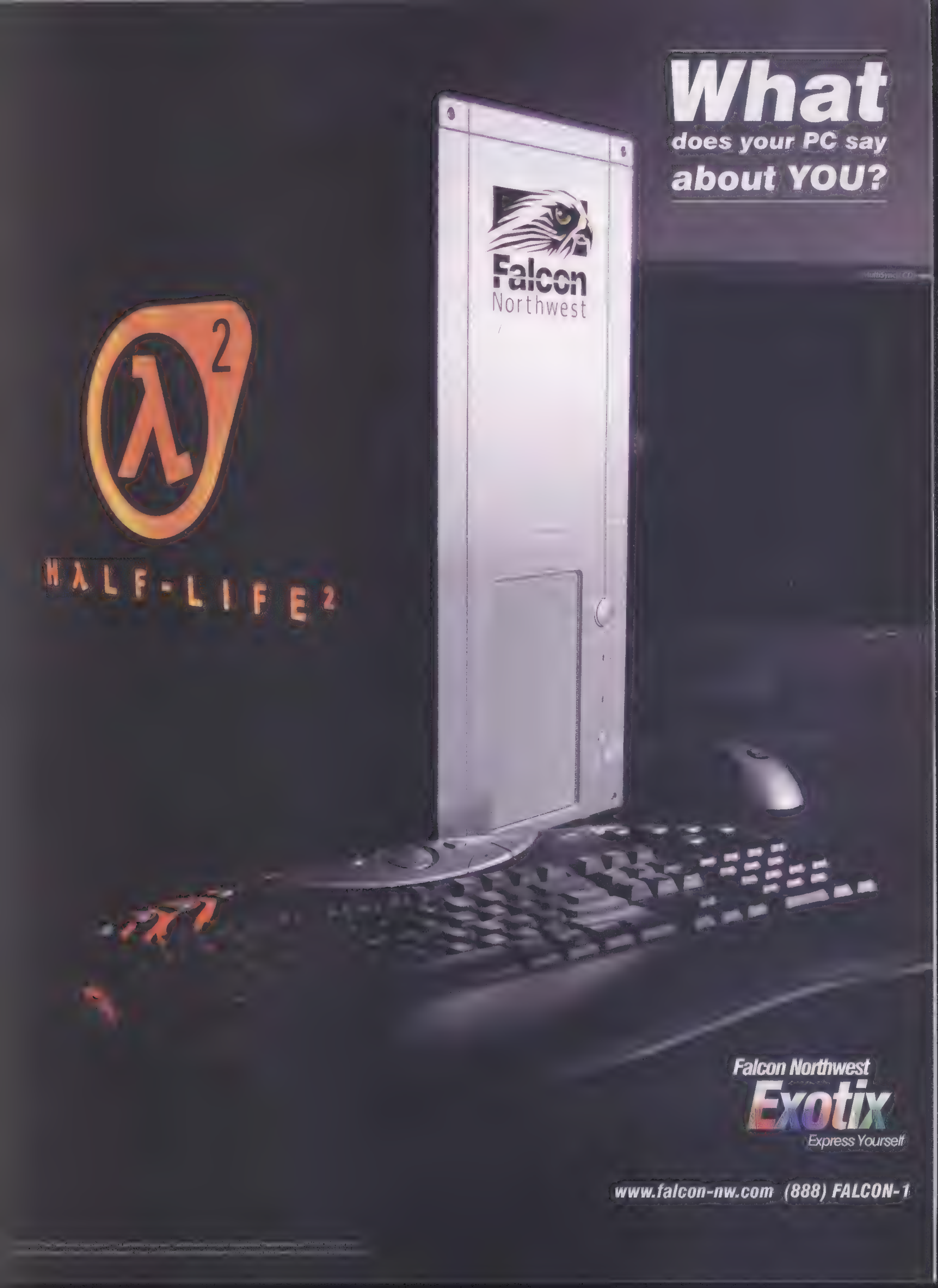
Nevertheless, the real value add of online advertising is that it is smarter than TV or print or radio or billboards. Web ads can tell an advertiser who viewed her ad, for how long, and whether that user took action. While Hardoof does see more video stream ads in coming years, he emphasizes that future ads may be smarter than richer. One growing trend is using an ad to make one-to-one contact with a potential customer by letting a viewer put an email address directly into the ad and request more information.



Cleverness trumps intrusiveness. In this Hanes ad, a man walks on-screen and scratches his back with the "T" in the Yahoo! Sports logo before Michael Jordan delivers the tagline, "It's gotta be the tag."

The back end is about to become more sophisticated, as well, so that ad servers such as Eyeblaster will become integrated with other data sources. In this way, online ads could include real-time data streams, such as a stock ticker, news headlines, or even the current stocking status of the product being advertised. Imagine that: ads that tell you things you really want to know. CPU

by Steve Smith


What
does your PC say
about YOU?
Falcon
Northwest
HALF-LIFE 2
Falcon Northwest
Exotix
Express Yourself
www.falcon-nw.com (888) FALCON-1

Coder's Corner: XML

XSLT, Part 12: The Muenchian Method

Last month we introduced the <xsl:key> element, which lets you create an index of nodes that are accessible using the key() function. We used a simple example to show this. Starting from a list of <item> elements containing <favoriteColor> and other content, the style sheet created an index of the <item>s using the <favoriteColor> as the key. An <xsl:for-each> element then used key() to retrieve from this index all nodes indexed under a specific key value (such as blue or red).

You can combine key() with generate-id() to create links to nodes retrieved from the index. As discussed in August 2003's "Coder's Corner," an XSLT processor assigns each node in the source XML data its own unique ID value, which generate-id() can access. It doesn't matter how the node is accessed; XPath expressions or key() are both fine. Indeed, it's easy to modify our August example (available at www.utoronto.ca/ian/articles/aug03) to create the list of link targets using <xsl:key>, key(), and generate-id().

However, you can also use <xsl:key> and generate-id() to group XML data, such as taking one ordered structure and creating a new set with another structure. In previous articles, we've accomplished this using XSLT loops and test conditions, but indexes and generated-id() often allow for more powerful and flexible grouping. The general approach, called the Muenchian Method is our topic this month.

The Data & The Goal

The starting point is our list of famous physicists:

```
<data>
 <item>
   <name>Marie Curie  </name>
   <birthday>7 November 1867</birthday>
   <birthPlace>Warsaw, Poland</birthPlace>
   <favoriteColor>green</favoriteColor>
 </item>
... more items ...
 <a> <b> <c>
  <item>
   <name> Orville Fenderlob </name>
   <favoriteColor>blue</favoriteColor>
   <birthday>6 August 1950</birthday>
  </item>
 </c> </b> </a>
</data>
```

This is a sequence of <item> elements, with each containing information about a famous scientist, including birthplace, favorite color, and more. Note that the last <item> is nested inside <a>, <b>, and <c> elements.

The goal is to take this data and generate an output list (in XHTML) identifying all physicists having a given favorite color. That is, we want the output looking something like:

```
blue
list of physicists who love blue
green
list of physicists who love green
```

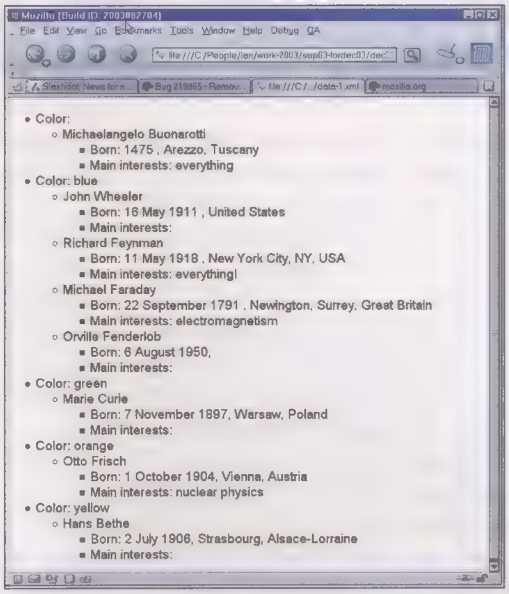
Create The Transformed Output

The goal seems simple: Generate a nested list, with the outer level listing the actual favorite colors from the list and the inner level providing information about the famous physicists who like that color. The following pseudo-code shows how we could do this:

```
<xsl:template match="data">
<xsl:for-each select="the list of unique favorite colors" >
    Color: <xsl:value-of select="a particular favorite color" />
      <xsl:for-each select="items with this favorite color" >
        output info about these items
      </xsl:for-each>
</xsl:for-each>
</xsl:template>
```

The first <xsl:for-each> loops over the possible favorite colors (and prints the color), while the second loops over items having this color, printing out relevant information. This looks easy in theory but is difficult in practice. To see why, think of the needed steps. The style sheet has to:

- For the outer loop, identify all the color names, but only print each color once
- For the inner loop, identify for each color value all the <favoriteColor> nodes that have that color, find the *parent* <item> elements for those nodes, and print out information about those nodes


Mozilla {Build ID: 2003082704}
File Edit View Go Bookmarks Tools Window Help Debug QA
file:///C:/People/ian/work-2003/sep03-fordec03/dec
Slashdot: News for n...
Bug 219865 - Remov...
file:///C:/../data-1.xml
mozilla.org

- Color:
  - Michaelangelo Buonarotti
    - Born: 1475 , Arezzo, Tuscany
    - Main interests: everything
- Color: blue
  - John Wheeler
    - Born: 16 May 1911 , United States
    - Main interests:
  - Richard Feynman
    - Born: 11 May 1918 , New York City, NY, USA
    - Main interests: everythingl
  - Michael Faraday
    - Born: 22 September 1791 , Newington, Surrey, Great Britain
    - Main interests: electromagnetism
  - Orville Fenderlob
    - Born: 6 August 1950,
    - Main interests:
- Color: green
  - Marie Curie
    - Born: 7 November 1897, Warsaw, Poland
    - Main interests:
- Color: orange
  - Otto Frisch
    - Born: 1 October 1904, Vienna, Austria
    - Main interests: nuclear physics
- Color: yellow
  - Hans Bethe
    - Born: 2 July 1906, Strasbourg, Alsace-Lorraine
    - Main interests:

This image shows XHTML data generated by the example style sheet described in this document (as generated and displayed by Mozilla 1.5).

We can do this using XPath expressions, but the resulting style sheets are typically slow to execute (particularly with big data sources), complex to maintain, and hard to understand. Things are much easier with indexes.

The Muenchian Grouping Method

The elegant solution to the first part of the problem is called the Muenchian Method. Originally developed by Steve Muench of Oracle, this powerful method has some complex subtleties. The following describes the approach in detail.

The first step is to create an appropriate index of the <item> element nodes using the child <favoriteColor> values as the key. The relevant markup (at the start of the style sheet) is:

```
<xsl:key name="byColor" match=
"item" use="favoriteColor" />
```

This creates an index named "byColor." As discussed last month, the match value (an XPath expression) defines the nodes to include. The XSLT processor creates the index by traversing the entire document, adding to the index nodes where the match value is "true." Match="item" matches every <item> element, anywhere in the document.

The next step—inside the template—is to select and process a list of unique colors from the available <item>s. This is where the Muenchian method comes in. Using this method, the loop is:

```
<xsl:for-each select="item[generate-id()
= generate-id(key('byColor', favorite
Color)[1])]" >
```

Working through this, we can interpret the parts. First, the outer item[. . .] means the loop is selecting <item> elements. The expression inside the brackets defines which items will be selected. The XSLT processor examines all <item> elements in the document but selects only those where the expression inside the brackets is valid.

To the left inside the square brackets is generate-id(). This returns the ID value corresponding to each <item> node being considered for selection. To the right is the expression: generate-id(key('byColor', favoriteColor)[1])

This takes the value of the <favoriteColor> child element of the particular item element being considered for selection and uses key()to retrieve all the indexed item elements having this favoriteColor value (key(;byColor', favoriteColor)). Next, the expression takes the first item in that list ([1]) and returns the ID value corresponding to that node.

The last step is an equivalency test: generate-id() = generate-id(key('byColor', favoriteColor)[1]). This tests to see if the <item> node being considered (left side) is actually the first node in the list of <item> nodes having this particular favoriteColor value (right side). If so, then the value is true, and this node is included in the select list. If the answer is false, this node is skipped.

So, this nifty select expression accomplishes the following:

- Examines all <item> elements anywhere in the document and identifies all possible favoriteColor values in them
- Selects only one <item> element for each favoriteColor (the first one in the index corresponding to that color)

Once this outer task is accomplished, it's easy to build an inner loop that selects the item elements with the chosen color. Once the outer list is done, the color value is known, and the items can be pulled from the index. The expression is: select="key ('byColor', favoriteColor)"

Because the selected color value is contained in the <favoriteColor> element of the selected <item> element. The entire template is then:

```
<xsl:template match="data">
<ul>
<xsl:for-each select="item[generate-id()
= generate-id(key('byColor', favorite
Color)[1])]" >
<xsl:sort select="favoriteColor " />
<li> Color: <xsl:value-of select
="favoriteColor" />
<ul> <xsl:for-each select="key
('byColor', favoriteColor)" ><li>
<xsl:value-of select="name" />
<ul><li> Born: <xsl:value-of select
="birthday" />,
<xsl:value-of select="birthPlace" />
</li>
<li> Main interests: <xsl:value-of
select="mainInterest" /></li>
</ul></li></xsl:for-each>
</ul></li> </xsl:for-each> </ul>
</xsl:template>
```

Note the <xsl:sort>, which sorts the color values in the outer loop into alphabetical order. CPU

by Ian Graham

(Full examples of the documents in this article are available at www.utoronto.ca/ian/articles/dec03.)

by Lisa Lopuck

Multimedia Goes Online

Remember designing multimedia CD-ROMs 10 years ago? Back then the work was media rich where video seamlessly integrated with graphics, animation, and layers of navigation design. I'm sure you can well imagine, then, how any interactive designer in 1993 would snub her nose at the relatively flat experience offered by the first Web sites arriving on the scene. To me, Web sites back then looked about as interesting and well designed as a Yugo when compared to the Cadillacs people were building for CDs.

Still, the Web progressed rapidly, and browsers and technologies began to support more and more layout and design features. It wouldn't be long before the cool user experiences we were building for CD-ROMs would one day be possible on the Web. Fast forward 10 years to today, and we find that much of the interaction and media design strategies we employed and even invented back then are once again relevant.

And the issues are the same today: How do I get the most out of limited screen real estate and limited bandwidth while maintaining usability? Through the use of Flash, DHTML, and JavaScript, the following time-tested strategies for solving these issues are possible for the Web. Multimedia is back, and it's online.

> **By using a combination of media interaction design strategies, you can fit a lot of content into a relatively small space and provide an engaging user experience.**

Space

Need more space? Think about how you can minimize and maximize the space you do have. If your Flash area on the Web page is just 550 x 250 pixels, use Flash's powerful AcitonScript to build collapsing navigational or content elements that "bloom" or open like a drawer and become interactive when the user rolls over them. Or, like the dock (a row of icons) in Mac's System 10, the icons magnify upon rollover. This is often called the fisheye effect.

Another technique is panning. Make the interface larger than the media space so the user must pan to see everything. Look at www.disneyland.com to see a panning media space. Users can either roll to the edges to pan the space or use a proxy (a miniature map of the space with a little You Are Here icon that users manipulate to pan). Virtual tour "360°s" are also a good panning example.

Time

The second strategy for maximizing your screen real estate and alleviating bandwidth problems is the use of time. By cycling multiple options in and out over time, you not only create an "attract loop" that captures attention on the page, but you can also fit a lot of content in a relatively small space. I've found this technique especially useful when you have a variable amount of content. For example, one month you have three specials, and the next month you have 10. By showing only two on the screen at one time, the screen does not look crowded one month and sparse the next. And by loading content in progressively smaller pieces, the user perceives a faster download.

Layers

Similar to the bloom technique, you can hide content and navigational options underneath icons or buttons and reveal them upon rollover or click. The common example is a navigational pull-down menu. A more creative approach, however, are floating "palettes" that the user can drag around in the media space or collapse when not in use.

Combine Strategies

Because each project is unique, the best approach is to combine strategies. For example, you can design a proxy icon that controls a panning space. Within the panning space, you can embed links to other panning spaces, or you can use the bloom strategy to enlarge and activate various content elements. By using a combination of media interaction design strategies, you can fit a lot of content into a relatively small space and provide an engaging user experience.

Now that I've reminisced about interactive design as it's come full circle over the last 10 years, I'm feeling nostalgic about media through the ages. See my Top 10 Holiday Wish List! ■

You can contact Lisa at lopuck@cpumag.com.

Holiday Wish List

1. *Old Atari games*
2. *Castle Wolfenstein (Apple IIE)*
3. *Olympic Decathlon (Apple IIE)*
4. *Prince of Persia (Early Mac game)*
5. *Myst (A classic to hold on to)*
6. *The Secret of Monkey Island (Lucas Games)*
7. *SimEarth (Loved when sentient lizards took over the earth)*
8. *Early Amazon.com (My first successful online credit card purchase)*
9. *Suspect.com (One of the first Webisodics)*
10. *PlayhouseDisney.com (Keeps my 5-year-old busy)*

by Rob "CmdrTaco" Malda

hohoho.txt

It's the holiday season once again, which means authors around the world can cop out on writing about the serious issues in the world and instead give out suggestions on what you can buy your loved ones during the annual gift frenzy that accompanies this time of year. So without any further ado, I present Rob's Christmas 2003 Suggestions For Geeks!

FireWire enclosures. These days most every new computer comes with a FireWire port. One of the most convenient uses for them is an external, semi-portable hard drive. This simplifies hardware upgrades, eases the growing pains of your MP3 collection, and just gives you room to work on that independent film that's been cluttering up your notebook's hard drive for the last year. There are a dozen companies making them: Just Google for FireWire enclosure. You won't regret this one.

Flavia (www.flavia.net). This is a cool little coffee machine that makes individual cups of coffee. While it is more suited to the small office, your average geek probably consumes as much coffee on any given day as a small office does. This $100 machine will also teach you that a "cup of coffee" is about half the size of your favorite mug and that you should make green tea if your heart has been skipping beats after the ninth cup of the day.

Don't settle for any version of "The Lord of the Rings: The Two Towers" that is less than three and a half hours long!

X-10. Its ad campaign may very well be the most obnoxious thing to curse the 'Net, but the fact is that X-10 is pretty cool. For just a few dollars, you can control any outlet in your home from your PC or from a special remote control. Lights, appliances, cameras; you can control them all with motion sensors, clocks, and more. With proper configuration, you may never need to leave your chair again.

iSight. Apple's little camera is a little pricey: $150 for a FireWire camera that you could buy from other vendors for less. But if you're a Mac user, it's the only choice because, well, Mac users are elitist snobs, and they need all their stuff to be aluminum now. Oh, plus it's a real class act. Installation is absolutely trivial, and iChat AV is brain-dead easy. But make sure not to tell your boss your IM nick, or you won't be able to flick him off when he makes those stupid suggestions at meetings.

Slashdot T-Shirts. All right, so I'm tremendously biased, but you'd be hard-pressed to find a more stylish way to prevent your naked chest from being exposed to the world, and I've seen you in the shower. You can get them from www.thinkgeek.com, and while I don't get a cut of the action, the ladies won't be able to resist you in your stylish new threads. Or at least that's the theory.

GameBoy Advance. Life is full of annoying little delays, like waiting through the commercials at the start of a movie or sitting on hold while waiting for the jerks at your favorite hardware vendor to take your machine back. The GameBoy Advance ($100) is tiny and rechargeable, and with a copy of Final Fantasy Tactics ($50), the next 100 hours you might have otherwise wasted can be better spent killing monsters. Somebody's got to do it.

Spare notebook charging cube. Your favorite geek may very well already have a notebook, but what he may lack is the ability to charge his toy in each and every conceivably place he may want to sit. The office? The home office? The road? The living room? The bathroom? All right, you may wanna draw the line on that last one.

DVDs. Geeks tend to be pretty obsessed with popular culture, and so far, there is no better format for getting pop culture into your home than DVD. A DVD costs from $15 to $100, so look into the "Alias" season one box set, any season of "Buffy the Vampire Slayer" (I recommend the third season), "Spirited Away," "Cowboy Bebop," "Noir," and "The Lord of the Rings: The Two Towers," but don't settle for any version that is less than three and a half hours long!

Roomba. Hygiene tends not to be the strong suit of the geek, as evidenced by the fine layer of dirt that encrusts the floor of his natural habitat, but never fear! Robotic-Vacuum.com (www.robotic-vacuum.com) sells Roomba, a $200 little robot who sucks well. You charge it up and let it run rampant around your domicile. A few minutes later, the filth is gone! Now if I could only find a robot to dust. . . . ■

I'll be waiting under the mistletoe at malda@cpumag.com.

Holiday Wish List

1. Final Fantasy X-2 for PS2
2. Dual 2GHz Apple PowerMac G5
3. World peace
4. Broadband to my home
5. HDTV TiVo
6. Gigantic plasma screen TV
7. A vacation
8. My 1997 body weight
9. A sandwich
10. An arrest-me-red Corvette

by Joan Wood

Ch-ch-ch-ch-changes!

Holiday Wish List

1. Peace
2. Justice
3. Portable wheat detector
4. Hybrid transporter (with garage)
5. S.T.A.L.K.E.R. oblivion lost or XIII
6. Real self-cleaning kitty litter (second year)
7. Real speech recognition
8. Fruit that tastes like fruit
9. Quantum physics-based storage container
10. Windows 95 emulator

If the Internet is going to become more than just a glorified super mall, new forms of existing media and communication must evolve. I'd like to propose useful spam and article research archives.

Spam I Want

It happened without fanfare, just another morning mailbox full of offers for miracle weight loss, fantastic mortgage refinancing, and unbelievable body part enlargements (now as a convenient dermal patch!). As I deleted my way through random letter-generated subject headings (trying not to miss the occasional note from my editor or hardware briefing invitation), I came upon the holy grail of spam: an unsolicited solicitation to buy something I actually wanted.

OK. So it did turn out to be just a front for another pyramid scheme, but it got me thinking: Why isn't there any spam that I want? If spam is such an effective marketing tool and it is so easy and inexpensive to deploy, why are there no legitimate offers for stuff I would actually buy waiting for me every morning? Shouldn't there be discount coupons for products I might use, trial subscriptions to magazines I might read, and vacation packages to places I might go jamming my inbox? Wasn't the promise of the 'Net to deliver an individualized online shopping extravaganza to each and every 'Netizen? How did this important marketing medium get hijacked to service only prescription drug abusers, potential cable TV thieves, and compulsive porn surfers?

> Maybe the solution to our spam problem is *gasp* more spam.

Maybe the solution to our spam problem is *gasp* more spam. What if the junk spam for things I don't want were to be overwhelmed by a flood of offers for things I do want? I don't mean letters I get through the opt-in feature on Web sites and product registrations; I mean real spam. Of course, it's a lame idea. Nobody wants more spam. But if I have to glance at the subject heading anyway as I blip through my deletions, I'd be cheered up considerably to see an ad for one of my Holiday Wish List items. And I'd probably buy it, too.

Online Article Research Archives

Have you ever wondered how much juicy information does not make it into a hardware article or technology piece? Sure, some content is just slapped together, but many journalists do a heck of a lot of research on their topic and then must whittle everything down into a final word count that fits into the time or space allotted. What happens to all that research? Mostly, nothing. Technical papers, marketing presentations, links to related articles, interviews, images, diagrams, notes from briefings: all sit on a hard drive waiting to be useful as background material on a related piece or get scavenged for snippets and contacts if the time comes.

But what if an article could function as both a synopsis of a topic for which you don't want more depth and a teaser to interest you in reading all the material that went into researching a topic when you want the whole enchilada? Like a movie trailer that gives away the plot but the plot is so interesting you want to see the movie anyway. Actually, more like a bibliography with hyperlinked footnotes, but that doesn't sound nearly as sexy, does it?

Some of the practical problems of instituting such a scheme include the possibility that research material is not already on the Internet and is likely to have copyright issues to clear before it can be published. Another stumbling block is payment to writers (they do have that pesky need to eat and pay rent). Most writers are paid by the word or by the page and don't get anything extra for transcribing long interviews or taking extensive notes. If writers' research notes became a standard part of the article package, I can imagine potential abuse in the form of shorter word allocations and extensive research listings.

But still, I can't help wishing there were an acceptable outlet for all this accumulated information, one that could be added to by readers and experts until it becomes a living reference source with ongoing updates and analysis. If it hasn't materialized by next year, maybe I'll stick it on my Holiday Wish List for 2005. Or maybe someone will sell it to me through new and improved spam! ■

Do NOT spam joan@cpumag.com.

Super wireless performance–
it runs in our family.

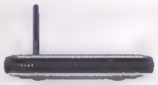
> Faster access to multi-player gaming

> Video streaming without jitters

> Effortless wireless connection – gets anyone up and surfing quickly

> Superior wireless range

Super G™ Technology – 10X Faster


WGT624
108 Mbps
Firewall Router

WG511T
108 Mbps
PC Card

WAG511
108 Mbps
Dual Band
PC Card

WAG311
108 Mbps
Dual Band
PCI Adapter

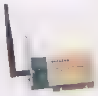
Introduce your family to our NETGEAR® 802.11g family that offers exceptional range, compatibility, security and super speed.

Now you can choose 802.11g technology with confidence, thanks to NETGEAR. Recipient of two CNET awards for exceptional performance and ease of use, our 802.11g family runs circles around other companies' wireless networking products. It's fully compliant with the recently ratified 802.11g standard and compatible with all 802.11b and 802.11g products.

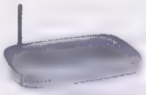
Our NETGEAR 802.11g family. The perfect addition to *your* family. For details, stop by for a visit at **www.netgear.com/go/g**.

WG602
54 Mbps
Access Point

WG511
54 Mbps
PC Card


WG311
54 Mbps
PCI Adapter

WGR614
54 Mbps
Router


WGE101
54 Mbps
Ethernet Bridge

WG121
54 Mbps
USB Adapter

Everybody's connecting.™

NETGEAR®

©2003 NETGEAR, Inc. NETGEAR is a registered trademark and "Everybody's connecting." is a trademark of NETGEAR, Inc. All rights reserved. Other brands and products are trademarks of their respective holder/s. E134 Smart Computing

Road Warrior

New Palms Pop, 3G Dutch Headaches, Cingular Wireless Has Its Own Headaches & More From The Mobile Front

by Chad Denton

Cingular Wireless: Number Portability Won't Be Smooth

Cingular Wireless is claiming that wireless number portability—which will allow users to keep their old cell phone numbers when moving to another local service provider—won't be as smooth as consumers might wish. To help consumers "maneuver through any unexpected pitfalls in the process," Cingular Wireless is planning "The A to Z of WLNP" checklist. (In case you're wondering, WLNP stands for wireless local number portability.)

A sampling from the list is available on Cingular Wireless' Web site, and a few tips are helpful. For instance, Cingular advises consumers to bring a copy of their latest bill when signing up for new service and not to cancel the old service before signing up with a new company. However, most of Cingular's "tips" should be common sense. Do we need Cingular to tell us we'll need a new phone if we switch from Cingular's GSM service to Sprint PCS' CDMA service? Anyone think number portability will somehow make it possible to get out of a wireless contract early? Nah, didn't think so. Unfortunately, we all know people who need such reminders. (Hi, Mom and Dad.)

Remember, the FCC has set Nov. 24 as the deadline for number portability. Subscribers in the 100 largest markets can keep their cell phone numbers when switching services (provided you're not physically moving to another part of the country). Most wireless companies are fighting the deadline in a manner reminiscent of telemarketing organizations fighting against the national Do Not Call Registry. Wireless companies are claiming the FCC has no authority to impose the local number portability on wireless carriers. ▲

Just In Time For Christmas: Palm OS 6

We'd hate to work at PalmSource over the holidays. The soon-to-be-independent developer of the Palm OS recently announced its plans to ship the final version of Palm OS 6 to developers Dec. 29.

Like the newly announced Tungsten T3, OS 6 will feature an API that lets users switch between Landscape and Portrait displays and support larger memo files. Under the hood you can expect a lot of changes. Some of the multimedia assets acquired from Be should make an appearance in OS 6, and look for better support for running multiple applications.

The big news for developers, however, is native ARM support. OS 5 provided support for faster ARM processors, such as Intel's XScale, but developers still had to write Palm apps for slower Dragonball processors. Although Palm OS 5 can run small snippets of ARM code, OS 6 will let developers write entire apps for ARM processors, providing a performance increase. Of course, apps written specifically for Palm OS 6 won't be compatible with older Palm OS versions. Palm OS 6 will still run code written for 68K processors, so developers can opt for performance or compatibility or release an ARM version and a 68K version of their products.

Devices running Palm OS 6 aren't expected until the spring. ▲

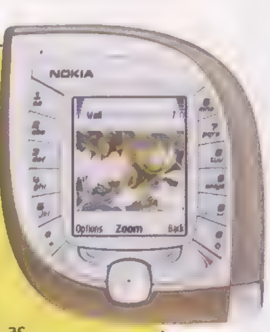
Cell Phone Headaches

Our two favorite debates in the cellular world are whether mobile phones pose a safety risk on flights and whether mobile phones cause tumors. Thanks to a study by three Dutch ministries, we might have a new favorite. The ministries for Economic Affairs, Health, and Telecommunications conducted a study comparing the health effects of new 3G wireless technology to older cellular technologies. According to the study, users living near 3G base stations were more likely to develop headaches and nausea than those living near traditional base stations. The study also indicates that those exposed to electromagnetic waves from any base station showed improved cognitive skills. Memory and reaction time, for instance, tended to improve with exposure. ▲

Another Toy We Can't Play With

Nokia's 7600 will make a Q4 2003 appearance in Asia, Africa, and Europe, but so far there are no plans for a North American release. Maybe we're just a little too close-minded in this hemisphere; we like our phones to actually look like phones.

And the 7600 doesn't look anything like a phone. (Check out the photo yourself.) Still, it has enough cool features that we'd love a chance to play with it. The 7600 has a 16-bit 128 x 160 color display; a 640 x 480 digital camera/video recorder; multimedia support; and Bluetooth, infrared, and USB connectivity. The phone is compatible with WCDMA/GSM networks at 900 and 1800MHz. ▲



This is a cell phone? Nokia's 7600 looks more like something out of Buck Rodgers than a cell phone, but it has an impressive list of features and, as you've probably guessed, no word yet on North American availability.

Down & Out Nationwide

Maybe Cingular should try blaming the impending number-portability deadline for its recent network outage. From Sept. 26 to Sept. 28, more than 900,000 of Cingular's 22 million subscribers were without service in the South, Midwest, and Northeast parts of the country. The outage only affected GSM networks built on top of older TDMA networks. According to reports, Cingular hadn't commented on the problem but was investigating the failure of an HLR (Home Location Register; a database that houses subscriber information and preferences) in Atlanta. Subscribers were rerouted to another HLR in Chicago (typically a common practice when an HLR fails).

Cingular is asking customers affected by the outage to call customer service (800/331-0500 or 611 from your Cingular Wireless phone) to request a credit. At press time Cingular was debating whether to issue blanket credits to all users in affected areas. ▲

Nokia N-Gage Coming To T-Mobile

T-Mobile began carrying Nokia's N-Gage mobile gaming system as of Oct. 7. T-Mobile sells the N-Gage for $299 with 30 days free online gaming and $50 worth of text and voice messaging. Unlimited online gaming will be available for $9.99 a month. The N-Gage, as you probably know, will also play digital music, tune in FM radio stations, handle email and personal information, let you browse the Web, and send and receive MMS (multimedia messages) messages.

In response to the N-Gage, Motorola and Nintendo have banded together on a new wireless adapter for Nintendo's Game Boy Advanced and Game Boy Advanced SP. The adapter will ship with Pokemon FireRed and Pokemon LeafGreen in Japan sometime during the first half of 2004. The adapter will let as many as five players compete against one another wirelessly. ▲

T-Mobile is set to offer North American service for Nokia's N-Gage. The N-Gage will cost $299 and come with 30 days free online gameplay. Unlimited service runs $9.99 a month.

New Powerful Palms

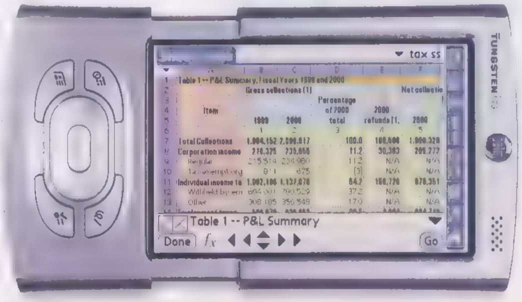
When the Tungsten T2 was introduced earlier this year, we were less than impressed with the minor upgrade. Palm released its T3 model Oct. 3, however, and this time the upgrade is much more appealing.

Palm has reworked the hardware buttons at the bottom of the T3, but otherwise it looks like other Tungsten T models. As with older models, the device's bottom slides up to hide the bottom third of the display to make the device slightly more compact. The T3 features a new virtual Graffiti area rather than a permanent Graffiti area. This expands the T3's resolution from 320 x 320 to 320 x 480. You can take advantage of the extra display space by switching between Portrait and Landscape modes.

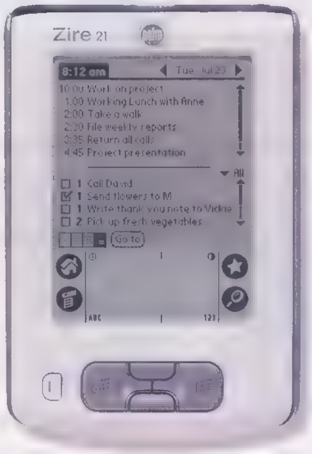
Internally, Palm has ditched the Texas Instrument OMAP processor found in earlier Tungsten T models in favor of a 400MHz Intel XScale processor. One of the T2's more compelling features was adding 16MB of memory for 32MB total. The T3 doubles that amount to 64MB for even more room for data and applications.

Palm has also made changes to the basic PIM functions. (Lest we forget a PDA is primarily for personal information.) An upgraded address book lets you enter multiple addresses for a single contact, and the updated Memo Pad lets you work with files as large as 32KB (instead of 5KB). The T3 sells for $399.

The T3 wasn't the only new device Palm introduced in October. The Tungsten E sports a similar design to the Tungsten T. It also features a color display, updated PIM applications, 32MB of RAM, a 126MHz OMAP processor, and a price tag of just $199. Finally, the Zire 21 features a 126MHz OMAP processor, a 160 x 160 grayscale display, and Palm OS 5.2.1 for $99. ▲



Tungsten T3



Zire 21

Tungsten E

Palm's fall line of PDAs includes some impressive upgrades. The new T3 includes a virtual Graffiti area, a 320 x 480 display, 64MB of RAM, and a 400MHz XScale processor.

Holiday Gift Guide
Part I

At Your Leisure

by Samit G. Choudhuri & Chris Trumble

Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in PC entertainment, DVDs, consoles, and just stuff we love, read on.

GameCube

Star Wars Rogue Squadron III: Rebel Strike
3D X-Wing Action, Take Three

The original Rogue Squadron game for the Nintendo 64 gave console gamers a shot at flying all manner of Star Wars ships in first- or third-person 3D and was a considerable hit. LucasArts and Nintendo followed up with an even more successful outing on Nintendo's GameCube console with Rogue Squadron II: Rogue Leader, a game that took the original premise and cranked it up to 128-bit mode. Now a third game in the series is out, and although in large part it's more of the same, LucasArts pulls out the stops and adds more variety in missions, more vehicles to fly and drive, and a few chances to take it to the Empire on foot.

We weren't quite as jazzed about the on-foot missions as we were at driving speeder bikes and flying around in the always-cool starfighters (you even get a crack at the Jedi Starfighter in a scene reminiscent of "Episode II"), but they do serve to break things up a bit. Graphics and sound are, as usual, quite good, and anyone who played the last installment will feel right at home with Rebel Strike's control set.

We hope you preordered this game at your local game store, as the bonus disc LucasArts provided included a fantastic, spot-on port of the 1982 Star Wars arcade game in all its vector graphics splendor. ▲

Star Wars Rogue Squadron III: Rebel Strike (NGC)
$49.99
LucasArts
www.lucasarts.com/products/rebelstrike

Flying an X-Wing in a pitched aerial battle is one of our favorite pastimes. . . .

But riding a tauntaun is pretty cool, too.

Mario Kart: Double Dash!!
$49.99
Nintendo
www.mariokart.com

The ultimate party game is back. Mario Kart: Double Dash!! is a blast for casual gamers and crusty vets alike and supports four-player simultaneous racing. When you get tired of "Pictionary," kick your party up a notch with Mario and his pals. ▲

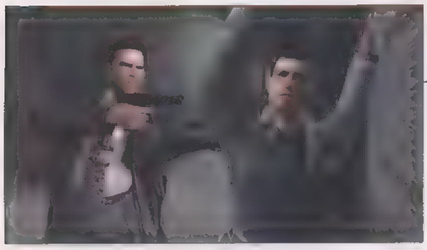
Resident Evil Code: Veronica X
$39.99
Capcom
www.capcom.com

Although it's been done on the PS2 and Dreamcast, Code: Veronica X is still a visually impressive game. It continues the epic saga of a few heroes' fight against the nefarious Umbrella Corporation and its out-of-control bioweapons research program. ▲

SSX 3
$49.99
ports BIG
www.easportsbig.com
/games/ssx3

Fast and furious downhill snowboarding action is the name of the game in SSX 3. EA Sports BIG combines incredible visuals, tight control, and precipitous snowy mountains in this excellent follow-up to SSX Tricky. ▲

Max Payne 2: The Fall Of Max Payne
A Film Noir Love Story



Max Payne is back with a vengeance, and you won't be making too many arrests.

Max Payne 2 is a graphical breakthrough that substantially improves over its predecessor with lifelike facial animation and character movements. Max has been pardoned for his deeds in the first game and is now an NYPD detective. The game opens with Max waking up in a hospital bed bruised, battered, and framed for murder. Playing through the game uncovers the plot and leads you to the beginning and the end.

This game features plenty action and gunplay. You can slo-mo dive in any direction without using Bullet Time resources, but the right mouse button will take you into Bullet Time 2.0. In BT2 you can dodge incoming bullets while making more precise shots. As Max takes down more enemies in the BT2 mode, he'll gain more BT2 time and slow time further while his own speed increases. You'll need this feature to make headshots as the on-screen bad guy count increases during the game. Though short, Max Payne 2 is a thrill ride all the way. The game is absolutely not recommended for younger gamers. The Xbox and PS2 versions will be available in December. ▲

Max Payne 2: The Fall Of Max Payne (PC, Xbox, PS2)

$49.99
Rockstar Games
www.maxpayne2.com

Freedom Fighters
Free America From Soviet Occupation

What would you do if this great nation were suddenly invaded by the Soviets? It goes without saying that you'd put up one hell of a fight. Freedom Fighters is a squad-based, third-person action game that has been released on all major platforms but looks and plays best on a PC capable of the maximum draw distances.

You start the game by saving a high-ranking member of the rebels and end up joining the fight to liberate America. Squad-based games can be complicated, but that's not the case with Freedom Fighters. Three simple squad commands will take care of controlling your team of up to seven freedom fighters: Recall, Attack, and Defend. You can apply your commands to either individuals or the squad. It is then that you'll notice the clever AI and strong path-finding skills that apply to both friend and foe. This feature makes the strategic elements stand out in what would otherwise be an average third-person shooter. Gameplay is varied, so you'll have a blast playing through the game, but the PC version comes up completely lacking in multiplayer modes, which will keep replayability to a minimum. ▲

Who knew that this plumber would become one of America's greatest freedom fighters?

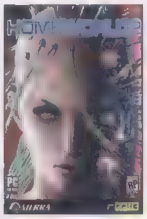
Freedom Fighters (PC, Xbox, PS2, NGC)

$39.95
EA Games
www.freedom.ea.com

Halo: Combat Evolved
$49.99
Microsoft Game Studios
www.microsoft.com/games/halo

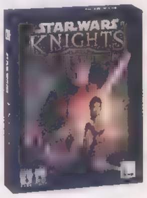
We waited two whole years, and Bungie's FPS looks and plays brilliantly with its hi-res graphics to challenge the latest video cards and Internet-supported multiplayer modes. Halo should never have shipped without the groundbreaking co-op mode on Xbox. If you've never played Halo, get it now. ▲

Homeworld 2
$49.99
VU Games
homeworld2.sierra.com



The original 3D strategy game developed by Relic Entertainment was released in 1999 to critical acclaim. This newest version doesn't deviate much from the original's gameplay elements, which is a good thing. Graphics are top-notch, and you will find that the game is very addictive though difficult in parts. ▲

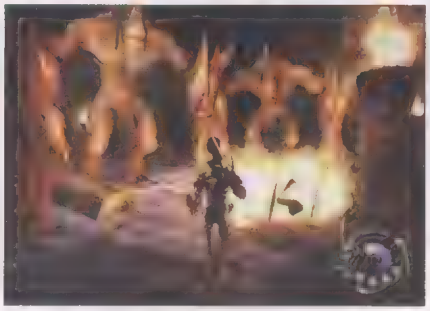
Knights Of The Old Republic
$49.99
LucasArts
www.lucasarts.com/products/swkotor



Reviewed for the Xbox in our October issue (page 87), KOTOR is one of the best "Star Wars" games to emerge since LucasArts' TIE Fighter. Developed by BioWare, this 3D RPG now features superior graphics, an upgraded interface, and new items. ▲

Otogi: Myth of Demons
Spirits In The Material World

Otogi: Myth of Demons continues Sega's tradition of publishing excellent action games. In the game, you play as Raikoh, a skilled warrior magically brought back from near-death by a force mysteriously known as "the Princess" to fight evil. As the story goes, men in ancient times created a mystical Great Seal to protect them from the denizens of the underworld. As you can probably guess, the Great Seal turned out to be less than great, and demons are swarming across the land. Those who opposed the creation of the seal were banished and have become powerful demons themselves—and they all want a piece of you.



It's just Raikoh and his sword against two giant ogres–hardly seems fair.

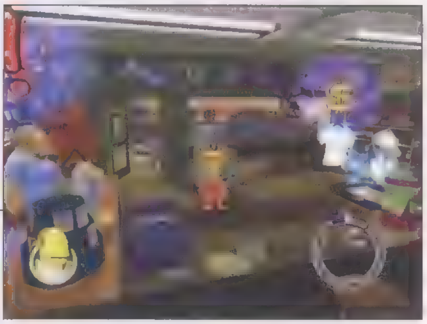
Otogi is a visual masterpiece, weaving a rich tapestry of varied environments and hordes of gruesome but imaginative monsters. The game does a good job of showing off the Xbox's graphical prowess thanks to its crisp textures, better-than-average lighting effects, and a mostly steady frame rate. Otogi also scores high in the audio category with its traditional Japanese mood music, varied sound effects, and some great (albeit occasionally repetitive) voice work. The result is a great third-person actioner that combines the over-the-top action of Sega's own Shinobi (PS2) with an immersive atmosphere on par with Capcom's Onimusha series. ▲

Otogi: Myth of Demons (Xbox)
$39.99
Sega of America
www.sega.com

The Simpsons: Hit & Run
A Game That Does The TV Show Justice

This game is currently available on all consoles but plays best on the Xbox. Most of the Simpsons games of the past have been forgettable, but Hit & Run is the exception. The concept is easy to explain: Think of the free-roaming environments of Grand Theft Auto III with a similar (but not M-rated) gameplay style, mix in the world of "The Simpsons" with a liberal dose of humor, and you've got Hit & Run.

Unlike a game like GTA or the upcoming True Crime: Streets Of LA, The Simpsons: Hit & Run is a game you wouldn't mind your teenager playing. Better yet, it's a game you won't mind playing for two hours or in 15-minute increments. There are plenty of secrets to discover, extra missions to complete, inside jokes for fans of the show, and more. You will assume the roles of Homer, Bart, Lisa, and Marge in a variety of enjoyable and sometimes challenging missions in your quest to find out about the mysterious bees and black fans that have appeared in Springfield. The graphics are reminiscent of 3D Homer from the 1995 Halloween special. Voices, animations, characters, and locations are spot-on. ▲



The Simpsons: Hit & Run took us by surprise. Think GTA3-style gameplay in Springfield.

The Simpsons: Hit & Run (Xbox, PS2, NGC, PC)
$49.99
VU Games
hitandrungame.com

Project Gotham Racing 2
$49.99
Microsoft Game Studios
www.xbox.com
/en-US/pgr2

PGR2 looks better than its predecessor (hard to imagine) with an all-new graphics engine and heavy Xbox Live integration. This first party top-gear racer features more than 100 cars and 150 new licensed tracks. Better driving will kick up your Kudos points, which will let you unlock more stuff. ▲

Grand Theft Auto Double Pack: The Xbox Collection
$49.99
Rockstar Games
www.grandtheftauto.com

The original GTA3 and GTA: Vice City finally debut on the Xbox with several improved technical features, such as enhanced in-game graphics, 480p widescreen support, and Dolby Digital 5.1. You'll also be able to create custom radio stations. Recommended for adults only. ▲

Xbox Music Mixer
$39.99
Microsoft
www.xbox.com
/en-us/musicmixer

Includes microphone and adapter with Music Mixer software so you can embarrass yourself at karaoke parties. New network functionality lets you transfer PC content (photos, music) to your Xbox for such things as custom slideshows. Xbox Live enables new music visualization downloads. ▲

Jak II
Jak's Back & He's Mad

Jak II takes the concept of the original Jak and Daxter game and adds elements of Grand Theft Auto, a whole new set of environments, and an even more compelling story.

The original game's sunny island setting is replaced by a gritty urban setting called Haven City that's under the rule of a ruthless tyrant named Baron Praxis. The Baron experiments on Jak for two years, infusing him with dark eco (the nasty stuff that changed Daxter into a rodent in the first game) and Jak is . . . different. He absorbs dark eco from fallen enemies and saves it up. When he gets enough, he can temporarily turn into Dark Jak, a gray-skinned, black-eyed, ferocious version of our hero.

Jak II is still a platformer at heart, but it incorporates an incredible variety of game play elements. You can jump on any vehicle hovering by or parked on the street and take off in it. In addition to the traditional spin moves and cutesy attacks, you'll tote a few powerful weapons that reflect the game's somewhat darker motif. Jak II controls like a dream and is a visually stunning, flat-out blast. Thumbs way, way up. ▲

When you store up enough dark eco, you can transform into Dark Jak, a new, angst-ridden version of one of our favorite game heroes.

Jak II (PS2)

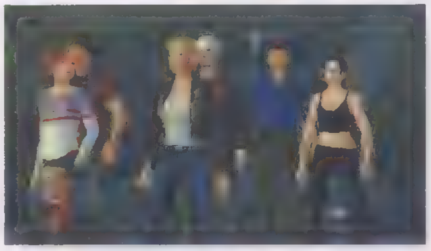
$39.99

Sony Computer Entertainment America

www.us.playstation.com

Buffy the Vampire Slayer: Chaos Bleeds
Return To Sunnydale

Whether you're a longtime Buffy fan mourning the end of the TV series or an action gamer looking for kicks, Buffy the Vampire Slayer: Chaos Bleeds delivers in spades. The first Buffy game, released by Electronic Arts for the Xbox in August 2002, took lots of gamers by surprise. Movie and TV licenses don't always make for the best video game themes, but EA infused the game with impressive production values and ended up with a darn fine game. Not to be outdone, Vivendi Universal is following up with its own game featuring the Buffster and an original story created with lots of help from the show's cast and crew.



The Scoobies return to a console near you for more stake-pounding, one-lining action.

Chaos Bleeds, not surprisingly, serves up a healthy dose of vamps, zombies, and all sorts of nasties straight from Sunnydale's infamous Hellmouth. The game lets you play as six of the show's main characters, including Buffy, Xander, Willow, Spike, Sid the Dummy, and—our personal fave—Faith. Thanks to decent control, nice graphics, and plenty of voice help from the series' stars, Chaos Bleeds is a fun romp through the house that Joss built. ▲

Buffy the Vampire Slayer: Chaos Bleeds (PS2)

$49.99

Vivendi Universal Games

www.vugames.com

Ratchet & Clank: Going Commando

$39.99
Sony Computer Entertainment America
www.us.playstation.com

Ratchet & Clank: Going Commando is another PS2 sequel that will be hot this holiday season. The game brings back its predecessor's heroes and quirky sense of humor and adds some new stuff, including a slew of new weapons, planets, and enemies and a new health system for Ratchet that rewards rampant destruction. ▲

Final Fantasy X-2

$49.99
Square Enix
www.square-enix-usa.com

Final Fantasy X-2 marks a couple firsts for one of the most popular RPG franchises in console gaming: It's the first FF game to feature a female lead character, and it's the first real sequel to an FF game (the story picks up shortly after Final Fantasy X). The game is available only in Japan, but should be in stores shortly after you read this. ▲

Battlestar Galactica

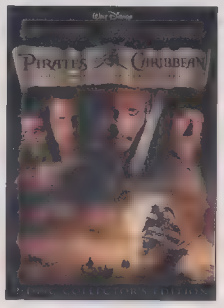
$49.99
Vivendi Universal
www.vugames.com

If you grew up watching Starbuck and Apollo blow Cylon Raiders out of space, you'll be glad to hear that in addition to an all-new miniseries, the Battlestar Galactica universe is finally getting video game treatment, thanks to Vivendi Universal. The game will be available on PS2, PS, and Xbox. We can't wait another centon. ▲

DVD Byte by Todd Doogan

Oh, to be young and in love with DVD. Hopefully by now you've all run out and picked up the book "The Digital Bits: Insider's Guide to DVD" at your local retailer or online, and you know just about everything you need to know about the digital revolution. If not, be sure to get one because it's actually very good and quite informative (if I do say so myself).

But hearing me shill my book isn't why you're here. You want to know what's coming to DVD. Well hang on to your pants, 'cause there's plenty. Dec. 2 is a big day for TV lovers, as it sees the release of **Alias Season Two**, **The Ben Stiller Show**, and **The Jamie Kennedy Experiment**. Also look for **Pirates Of The Caribbean: Curse Of The Black Pearl**, the long-awaited **To Live And Die In LA**, and more of those **Walt Disney Treasures** (including Mickey in color and Donald Duck's cartoons). Dec. 9 features, among others, **Bad Boys 2** and TV's **Firefly** (from the creator of Buffy). On Dec. 16 look for the new **Escape From New York** special edition, **The League Of Extraordinary Gentlemen**, **Seabiscuit**, and **South Park Season Three**. In case you haven't already spent your monthly allowance, Dec. 23 will reveal Woody Allen's **Anything Else**, Rob Reiner's **Alex And Emma**, and Gary Oldman's brilliant directorial debut **Nil By Mouth**.



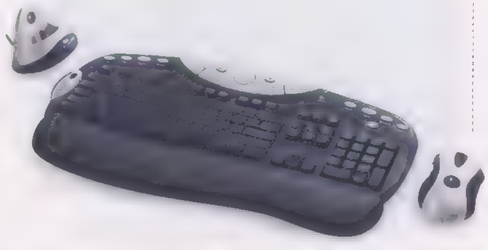
Next month, look for our in-depth look at the **Alien Quadrilogy**, whose production was featured in our aforementioned book. Until then, keep spinning those discs. ▲

Two Mighty Desktop Combos
Logitech & Microsoft Go Cordless

Are you still playing games on your old beige-brown keyboard with that discolored mouse that always snags on your desk? We know you value your desktop space but are reluctant to give in to the lag that plagues so many wireless keyboard-mouse combos. Truly we do. To that end, we tracked down two combo products from big hitters Logitech and Microsoft that you may wish to consider. Both are solid products, but budget and technological need will dictate your choice. Take your pick.

You already know that we feel Logitech's RF MX700 rodent is probably one of the best wireless products of its type in existence—and it looks cool. What more could you want? Yes, performance. This highly accurate 800dpi mouse features eight programmable buttons and processes 4.7 megapixels per second.

But what about the lag? There is no noticeable lag because the MX700 performs on par with a corded mouse. It also uses more power than the average cordless, so Logitech saw fit to bundle a docking station that recharges the mouse when it's not in use. After raving about the MX700, we would be remiss in not mentioning the other half of the combo: the excellent zero-degree tilt multimedia keyboard, which also uses radio technology. We played a gamut of online and offline action games without any lag issues.



Logitech Cordless MX Duo

$99.95
Logitech
www.logitech.com

Microsoft Wireless Optical Desktop for Bluetooth

$159.95
Microsoft
www.microsoft.com/hardware/mouseandkeyboard

Next up is the Microsoft Wireless Optical Desktop for Bluetooth. After a dearth of Bluetooth products, the technology finally seems to be taking off. (Logitech has its own Bluetooth MX900 combo on the way.) The keyboard is based on the trusty Microsoft Multimedia Keyboard design but looks much cooler with its semi-translucent blue plastic. Likewise, the matching mouse (with silver accents) uses the Microsoft Wireless IntelliMouse Explorer chassis and looks equally good.

The bundled transceiver brings Bluetooth support to your notebook with its notebook adapter, so your notebook doesn't feel left out. We put the desktop combo through its paces and were quite satisfied: We didn't find one delay or hiccup. This combo only works with WinXP and will require you to have a keyboard and mouse already connected to install the software. Unlike the Logitech, you'll want to keep a spare keyboard and mouse around to do full operating system reinstalls.

We're looking forward to the Logitech MX900. More when it is released. ▲

X2VGA
Xbox On Your 21-inch CRT

Playing Xbox games on a 50-inch widescreen telly is great, but probably rare experience for most of us. Jousting for tube time with a spouse is also a poor way to spend rare leisure moments. That's where X2VGA comes in: You can connect the Xbox directly to your beautiful CRT (or LCD) monitor.

The unit is simple and sleek. You get full Xbox 480p (not 480i), 720p, or 1080p support. These settings are game-dependent, and X2VGA will work with all but some of the oldest 480i titles. Plug the X2VGA's Xbox connector into the back of the Xbox, attach the monitor's VGA cable into the X2VGA's VGA-out, select your choice of composite or optical-out, and you're good to game. The X2VGA featured outstanding display quality in everything we threw at it and it's an elegant solution to a problem that many of us face. Highly recommended. ▲

X2VGA

$64.95
Neoya
www.x2vga.com

Xbox Wireless Adapter MN-740
Xbox Live Loses The Cable

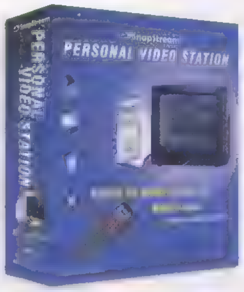
Microsoft's Xbox Live service has made playing games online and communicating with others a seamless experience. But wait; consoles typically sit in the living room and running cables into the living room can be very inconvenient. There's now a solution to speed your files to the Xbox from your PC.

The MN-740 is Microsoft's first-party solution designed specifically for Xbox. The unit features the Xbox logo and colors for those of you with a need to match your hardware—you know who you are. The MN-740 is a Wireless-G adapter that will add your Xbox to your local 802.11b/g network. Installation was simple enough for a completely nontechnical person to set up without help in a few minutes. In a nod to a better user experience, Microsoft also offers free 24-hour technical support for its latest Wireless-G products. ▲

Xbox Wireless Adapter MN-740

$139.99
Microsoft
www.microsoft.com/hardware/broadbandnetworking

How To Watch More Television
Snapstream PVS 3.3 & Hauppauge PVR-250



Not everyone has a new ATI Radeon All-In-Wonder card with the latest MMC 8.7 drivers, but that shouldn't keep you from watching television while you work. We didn't want to toss out our high-end video card, so we picked up a used Hauppauge Win-TV PVR-250 PCI card on eBay and then downloaded SnapStream's Personal Video Station 3.3. The Hauppauge card provided full MPEG-2 encoding in hardware, and the PVS 3.3 software worked beautifully.

Version 3.3's DVR interface is a force to be reckoned with and is the next best thing to having a home DVR. The software has been upgraded since our review on page 66 of the October *CPU*: PVS 3.3 now includes support for DivX, variable bit encoding for hardware encoders, and Windows Mobile 2003. Other recent updates improve the overall DVR experience by letting you watch a show that's already started recording. Now *this* is how you watch TV. ▲

SnapStream PVS 3.3

$74.99 ($64.99 download)
Snapstream
www.snapstream.com/Products/Products_PVS3.asp

Hauppauge Win-TV PVR-250

$149.99
www.hauppauge.com

Infinite Loop

Algorithmic Gender Bender

Moshe Koppel, a professor at Bar-Ilan University in Israel, and colleagues have developed a program that can tell with better than 80% accuracy whether a given text was written by a man or a woman. The program uses an algorithm that scans text for keywords and syntactical arrangements and attempts to determine the author's gender. One of the many things Koppel and friends found in a study of 604 documents was that men tend to write more about things and use more determiners such as "a," "the," "that," and "these." Women tend to write more about people and use more personal pronouns such as "I," "you," and "she."

Source: The Boston Globe

MODDING

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent small-form-factor enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community. Performance modding claims seniority, but the aesthetic aspect is expanding with astonishing alacrity. As a result, there are innumerable options for both camps.

Mods & Ends

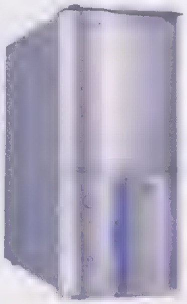
pcToys.com Techflex Sleeving

"Cleanliness is indeed next to godliness." So the saying goes. Avid case modders know the benefits of a smartly organized chassis, and performance enthusiasts are fully aware that tweaked systems require ample cooling.

Even still, a month ago we might have labeled cable sleeves as overkill. However, stray wires from a power connector falling into our processor's cooling fan quickly changed our mind. pcToys.com offers an array of sleeving kits ($17.95), many sensitive to UV light. Each kit includes four sizes of sleeves and heat-shrink tubing for an extra touch of professionalism.

Cooler Master Wave Master (TAC-T01)

Case design is a continually evolving art form. Some folks prefer chic little cubes, while others prefer large boxes with room to grow. Those in the first group should look to the wide selection of SFF systems on display at Computex this past September. Those of the latter preference should check out Cooler Master's Wave Master (about $165; www.coolermaster.com) chassis, a curvaceous little number that is constructed of aluminum alloy. A hinged door covers the four 5.25-inch drive bays and single 3.5-inch slot and latches to a magnetic fastener. The Wave Master weighs nearly 20 pounds, but it is as functional as it is stylish.



Cooler Master's latest design is large, aluminum, and curvy.

The Speed Strip SSA-1 is a remarkably simple overclocking tool that's also inexpensive.

Speed Strip SSA-1

Whereas Intel's Pentium 4 has lived its entire life with a locked clock multiplier, modders have been manipulating AMD's Athlon since its days as a Slot A processor. While it is true you can unlock the Barton and Thoroughbred cores with a conductive pencil, there's a safer way.

Speed Strip's SSA-1 ($15; www.speed-strip.com) serves the same purpose, and you can affix it to a processor by connecting the same pins you would normally modify by hand. The Speed Strip's only requirement is a model number AXDA Athlon XP.

Fashionably Fresh Firmware

Canon PictBridge-Compliant Firmware 2.0.0

If you own a Canon PowerShot G5, S50, S400, A70, A60, or A300, then consider downloading firmware version 2.0.0 to add PictBridge direct-printing compliance to your camera.

www.powershot.com/powershot2/customer/firmware.html

Plextor PX-708A/UF DVD±R/RW

Owners of Plextor's latest burner should grab the latest 1.01 firmware update. This version fixes several bugs that affect popular burning applications. The firmware also improves write performance on DVD media.

www.plextor.com/english/support/downloads/firm_708A.htm

SMC 802.11g Nitro Technology Update

SMC's BARRICADE g router and EZ CONNECT g adapters qualify for a free Nitro firmware update. The latest router firmware adds official 802.11g support and retains Nitro support, which reportedly improves range and network throughput.

www.smc.com/index.cfm?sec=Products&pg=Nitro-Technology&&site=c

KiSS DP-500 DivX-compliant DVD Player

The latest DP-500 firmware from Kiss Technology adds support for DivX 3.11 playback, augmenting existing version 4 and 5 support. The firmware also incorporates support for multiple content types on a single disc.

www.kiss-technology.com/?p=changelogdp500&v=press

by Chris Angelini

TOOLS OF THE TRADE

What Every Good Modder Needs

MODDING YOUR CASE IS A GREAT WAY TO ENHANCE YOUR RIG'S PERFORMANCE, POSSIBLY EXTEND ITS LIFESPAN, AND OF COURSE, give it your own homegrown "bling" appeal. Whether you're looking to dress up your rig for the next LAN meet or you want to optimize airflow inside the chassis, you'll need the right gear. After all, a performance-PC surgeon needs high-quality tools to do the job right. We'll detail some of those tools on the following pages via a case ventilation and window mod we recently performed.

Variable Speed Drill

Price: $90 to $150
Purpose: For making pilot and screw holes.

We used a heavy-duty Milwaukee corded model (our favorite manufacturer), but you could also opt for a cordless version. If you do go cordless, get at least a 14V or higher powered unit. There's nothing worse than getting halfway into that hole, only to have the drill bit bind because your motor-and-battery combination doesn't have enough torque or power.

Hole Saw

Price: $10 to $25; kits or singles
Purpose: For cutting fan holes.

Use a 3-inch hole saw for 80mm fans, and make certain the saw bits for your drill are capable of cutting through metal.

Jigsaw

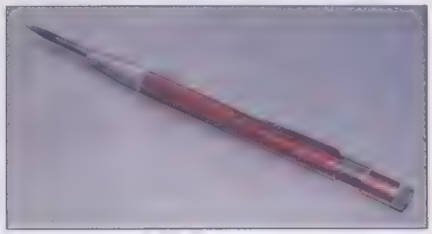
Price: $30 to $170
Purpose: For cutting smooth lines and free-form shapes in case panels.

The high-end model we used was around $170. As with most things, you get what you pay for. When working with metal, an "el cheapo" Black & Decker model may cut it—or not. If you use it to cut holes in metal often enough, its life expectancy will be directly proportional to that $29.99 price. We like Bosch and DeWalt jigsaws; they're typically sturdy, well-built models with plenty of motor power. Also, do yourself a favor and buy a variable-speed model.

Nail Punch

Price: $5.95
Purpose: For making tiny divots in case metal.

Using a nail punch is especially handy when working with metal because a drill bit can slide around initially when drilling. To create a starting point, just punch a small divot in the exact location you want the hole to go. Simply use a hammer to strike the top head of the punch, with the punch's point against the metal.



Dremel

Price: $35 to $80
Purpose: For cutting in tight spaces, sanding sharp metal edges, rounding off corners, and more.

Ah, the Dremel. Formally known as a rotary tool, the Dremel division of Bosch introduced and patented the original design, and it's now a household name. This little baby is by far the most versatile weapon in any mad modder's arsenal. It can sand, cut, and round edges in metal, plastic, wood, and other

Where To Buy

Beyond your neighborhood hardware store, there are plenty of online options for buying modding tools, including:

- Home Depot; www.homedepot.com
- Sears; www.sears.com
- Lowe's; www.lowes.com
- Dremel; www.dremel.com

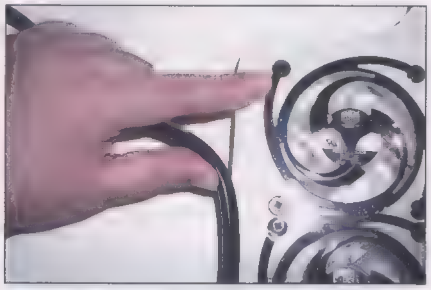
For fans, edge molding, and window kits check out these online options:

- Crazy PC; www.crazypc.com
- 1Cool PC; www.1coolpc.com
- FrozenCPU.com; www.frozencpu.com
- NewEgg.com; www.newegg.com

materials. Cutting with a Dremel, however, is significantly less accurate than cutting with a guided jigsaw. If you cut custom vent holes and windows in a PC chassis, use a Dremel to round and smooth the metal edges. (Otherwise, they'll slice you up quicker than a Ginsu in a bad infomercial.)

A Quick Modder's Guide To Ventilation Fans

For this article, we used our tools to do some stylish ventilation mods you can apply fairly easily to your own PC case. We chose 80mm lighted fans ($9 each) from Cooler Master and slick-looking chrome guards ($5 each) to trim off our vent holes. We also did a quick, easy window mod on a side panel of the case using a window kit ($10 to $20) that included rubber-edge molding for the edges.

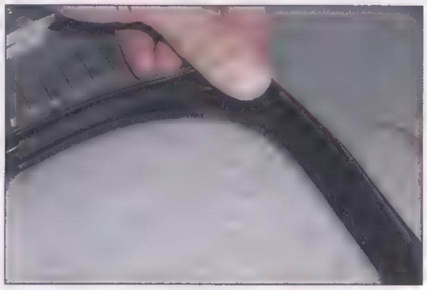


Applying the rubber-edge molding for our window-case mod.

These case mods are fairly commonplace today, and you can actually purchase cases with these mods already done. However, if you want to save a few bucks and add your own artistic touch, there's nothing like doing it yourself. First, we'll start with our victim, a standard-issue, drab, beige, no-name box we bought online for about $40.

Although our case had decent enough internal mechanical construction and build quality, it had a vanilla outer shell and was nearly devoid of exhaust fans, with the exception of the power supply. So we set out to cut out a few holes for vent fans.

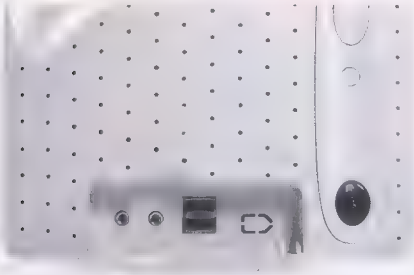
We traced a pair of guides with a lead pencil (which washes off easily after installation) across the top of our case at the exact width of the 80mm fans we were installing. We set the fans on the case and marked eight drill-hole positions that corresponded with each fan-mounting hole. For our two exhaust holes, we matched a 3-inch hole-saw bit to the diameter of the fan blades of the 80mm fans. It was then a simple exercise of finding the center position of the fan, based on half the diameter of the hole and its distances from two of the mounting holes. After we found dead center, we marked it, tapped in a guide divot using the nail punch, and started drilling with the hole saw.



The molding for our window-case mod was included in the kit we purchased.

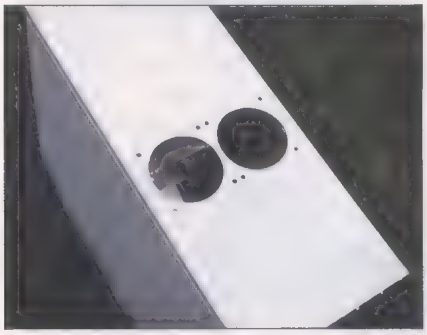
We used a cardboard template as a guide to cut our window in our case.

The case we chose for our window mod was a dull beige when we started.



We picked the vanilla case up online for a very reasonable $40.

A look at our case before we started making measurements and hacking away.



We used a hole saw to make room for our two 80mm exhaust fans at the chassis' top.

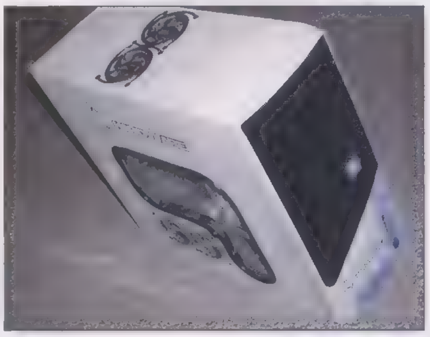
We used the Dremel to smooth the edges around the exhaust hole. Once the edges were clean, we mounted the fans on the inside and the chrome fan guards on the outside using the accompanying mounting screws.

We installed our fans at the top of our chassis because, in addition to heat rising, the warmest area inside the average ATX case is typically at the top where the power supply resides.

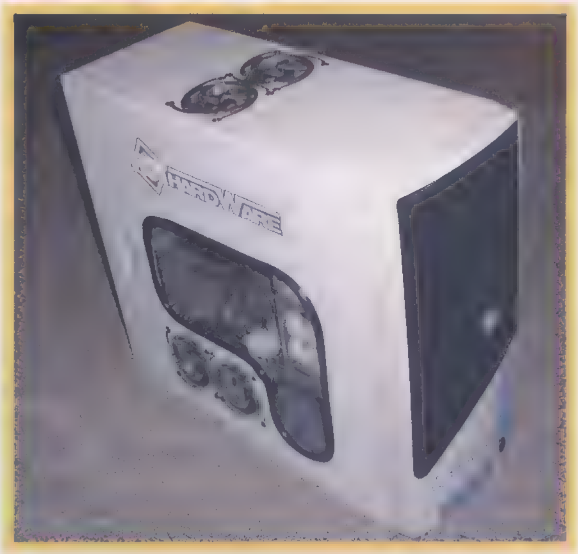
Next, we dropped two more fans into the side panel, cut a Plexiglas window mod, and applied some finishing with a delicate hand and can of spray paint.

The window mod was a piece of cake. We traced the shape of our L-shaped Plexiglas on the inside of the door panel. The window piece came pre-fabricated in the kit we purchased with Velcro doubled-sided stick-on mounting tabs. Next, we started a hole at the edge of the shape with a drill bit and cut all along the trace with the jigsaw. We smoothed the edges with the Dremel before trimming off the entire opening with the edge molding in our kit.

The slick-looking chrome guards we used were only $5 each and added some nice flare.



A can of spray paint later and our case had an entirely new look.



Finally, remember that spray paint is your friend. It's easy to customize a boring beige box just by pulling off bezels, spray painting them, and reinstalling them when dry. We used a semi-gloss, nylon-safe paint that turned our sleepy, drab-looking computer into a tricked-out performance rig.

We've given you a few tools and tips to be sufficiently "dangerous," so try things out for yourself. Maybe this holiday season you'll really surprise your significant other, loved one, or family member, with a gift request for something really exotic—perhaps a Dremel? CPU

by Dave Altavilla
(Dave Altavilla is editor-in-chief of HotHardware.com.)

A close-up shot of our case after adding the window, exhaust fans, and some color.

FEEL THE POWER

Antec TrueControl 550 vs. Vantec Stealth VAN-520A

There's more to a mod than clear windows and a pimped-up heatsink. You can't forget the power supply. But this can be a tricky purchase because enthusiasts are prone to overbuying. In our last power supply roundup (May *CPU*, page 18), we saw that overall wattage capacity was less important than examining how the three drive rails allocate the amperage. Performance systems in particular need to pay attention to the amperage specs of the +12V rail because this is where the most drain from power-hungry CPUs and hard drives will fall.

Antec TrueControl 550

A superstition pervades PC modding: If you take a multimeter or voltmeter to your PC, you should see *exactly* 3.3V, 5V, and 12V, and if you're a little astray from those numbers, it's better to have too much power than too little. Wrong, wrong, wrong. Being a couple percent off won't make any difference to your equipment, and having less voltage than spec is no different than having a bit more.

Thus, I can admire the TrueControl feature in Antec's 550 for its appeal to modders craving precision and manual control, but the fact is, it's just not needed. The TrueControl panel, which can support a 3.5-inch drive, features a fan control, adjustment tool, and three recessed adjustors for each voltage rail. Without the TrueControl attached, my voltmeter read 4.58V on the +5V line (well below the recommended Intel spec) and 11.56V on the +12V. Plugging the panel in registered 5.13V and 12.11V, which I could carefully adjust to within a fraction of a percent of 5V and 12V. Remember, you're going to get fluctuation during system use no matter what.

That silliness aside, the 550 is a very good unit. Total maximum output is 550W, and maximum amp load is 32A, 40A, and 24A on the +3.3V, +5V, and +12V rails, respectively. You get a 20-wire ATX power connector, four-wire 12V connector, seven four-wire large Molex connectors, two four-wire small Molex connectors, two two-wire fan connectors, a six-wire auxiliary, and a three-wire fan-signal connector. (SATA connectors are conspicuously absent.) Perhaps the best feature is an external four-wire power connector, which you can use to test a drive, fan, cold-cathode tube, and more.

With a standard 80mm blower fan and a second 92mm bottom fan sucking air off the mobo, the fans only spin at 1,500rpm, emitting just over 20dB in low-drain conditions. This was completely inaudible above my Radeon 9800's fan until I got my ear right up next to it.

TrueControl 550
$139.99
Antec
(888) 542-6832
www.antec-inc.com

CPU CPU CPU

The 550 is a bland, matte gray, but Antec spruced it up with gold fan grilles and black power connectors. Still, I'd pocket $30 and buy Antec's TruePower 480, which boasts nearly the same specs and component quality.

Vantec Stealth VAN-520A

Vantec's top-of-the-line unit is a marvel of stability and silence. The black aluminum casing looks sharp with practically any case color, except perhaps beige. Despite three dual-ball bearing fans, an integrated temperature sensor and Auto mode on the exterior three-way control switch render the 520A practically silent. On a minimal load, the 520A outputs just over 20dB. With the Top Silent technology enabled, it kicks out just 30dB under a 100% load.

Stealth VAN-520A
$139.99
Vantec
(510) 668-0368
www.vantecusa.com

CPU CPU CPU CPU CP

Better still, the unit's true sustained peak load is 620W, not 520W, and the maximum output current for all three rails are rated at 26A on the +3.3V, 52A on the +5V, and 28A on the +12V. Testing with a meter showed the +5V line hovering around 5.13V during regular use and the +12V at 12.2V, both well within the unit's ±5% tolerance range.

The 520A features 10 large 4-pin Molex connectors, two smaller 4-pin connectors, and the main power line terminates in a 24-wire ATX connector. (A 24-to-20-wire adapter for standard ATX boards is included.) Besides the usual 4-pin 12V ATX line, you get an 8-pin 12V ATX line for dual-CPU boards and a 6-pin auxiliary line. On the back face under the inlet jack, there's an AC outlet in case you've maxed out your power strip. You also get two SATA power adapters and zip ties.

With all of the over current, over voltage, short circuit, and shock protection you'd expect in a PSU of this caliber, the VAN-520A is an excellent, no-nonsense power supply suitable for any performance PC. CPU

by William Van Winkle

Give *your* car the luxury of satellite navigation.

© 2003 Garmin Ltd. or its subsidiaries

The StreetPilot® III from Garmin has features found in expensive in-dash navigation systems, plus one very important quality the others don't have. StreetPilot III is portable, so you can have the best in GPS navigation in any car you drive. Look up addresses, attractions and other services, and StreetPilot III will create a route and provide turn-by-turn directions with voice prompts to get you there.

StreetPilot III and GPS V from Garmin. Navigation for every car.

GARMIN. www.garmin.com NASDAQ **GRMN**

Available at: BEST BUY CITY COMPUSA

SOFTWARE TIPS & PROJECTS

Tell A Bigger Photo Story

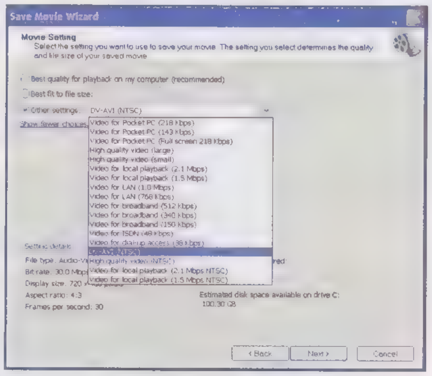
AS WE SAW LAST MONTH, THE NEW MICROSOFT PLUS! DME (DIGITAL MEDIA EDITION) PACK FOR WINDOWS XP HAS SOME COOL TOOLS IN ITS Photo Story program, which semiautomatically assembles your still images into animated and narrated slideshows. The program has a number of limitations, however. It has few transition effects, limited titling tools, and accommodations for only one music track in the background. Worse, it produces files in only one format, which works best in Windows Media Player Series 9.

Many Photo Story fans have discovered that the artful use of another under-appreciated Microsoft program, Movie Maker 2, can add immeasurably to the quality of your Photo Story. This month we'll pull the slideshows we made into Movie Maker 2, in order to add a new level of sophistication to your slideshows. If you haven't already, you need to upgrade to Movie Maker 2. You will find a link to this download at www.microsoft.com/windowsxp/moviemaker.

Slideshow Conversions

Photo Story turns your narrated slideshows into WMV film files, but these files work best in Windows Media Player Series 9. Users who want more options for file playback will be glad to know that Movie Maker 2 lets you convert your Photo Story into other formats. To get started, find MM2 by clicking Start, All Programs, Accessories, Entertainment, and Windows Movie Maker. If the Movie Tasks window isn't open on the left, click the Tasks icon on the Toolbar to open it. In Movie Tasks, click Import Video.

In the Import File dialog box, make sure you uncheck the Create Clips For Video Files checkbox. Disabling this option ensures that MM2 imports your Photo Story as a continuous film clip. Otherwise, the program hacks it apart into what its internal algorithms decide are appropriate scene changes. In our experience, the resulting clips introduce unnecessary video burps into the film. Later, we will show you how to divide your film into clips and add scene transitions of your own. With the clipping option unchecked, find your Photo Story WMV file and click OK to import it as a single clip into the MM2 Collection window.


Save Movie Wizard

Movie Setting

Select the setting you want to use to save your movie. The setting you select determines the quality and file size of your saved movie.

○ Best quality for playback on my computer (recommended)

○ Best fit to file size:

● Other settings: DV-AVI (NTSC)

Setting details

File type: Audio-Vi

Bit rate: 30.0 Mbps

Display size: 720

Aspect ratio: 4:3

Frames per second: 30

Estimated disk space available on drive C:
100.30 GB

Show fewer choices
Video for Pocket PC (218 Kbps)
Video for Pocket PC (143 Kbps)
Video for Pocket PC (Full screen 218 Kbps)
High quality video (large)
High quality video (small)
Video for local playback (2.1 Mbps)
Video for local playback (1.5 Mbps)
Video for LAN (1.0 Mbps)
Video for LAN (768 Kbps)
Video for broadband (512 Kbps)
Video for broadband (340 Kbps)
Video for broadband (150 Kbps)
Video for ISDN (48 Kbps)
Video for dial-up access (38 Kbps)
DV-AVI (NTSC)
High quality video (NTSC)
Video for local playback (2.1 Mbps NTSC)
Video for local playback (1.5 Mbps NTSC)
< Back
Next >
Cancel

Movie Maker 2 has its own mother lode of file formats for converting WMVs such as Photo Story files into movies that are suitable for Web sites, LANs, and even Pocket PCs.

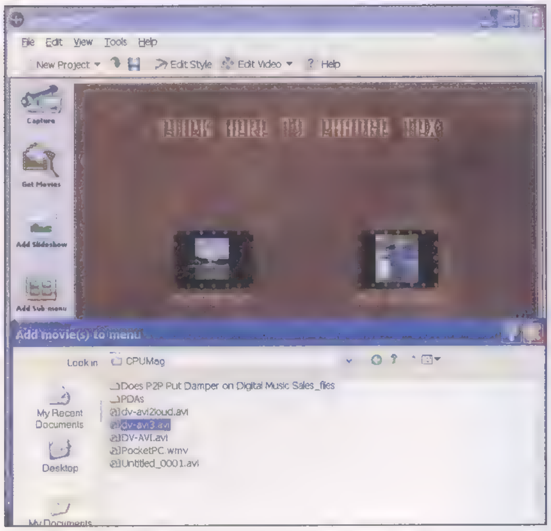
To convert your Photo Story film into a different format without any further editing, simply drag the clip from the Collection window into the first square of the storyboard, which runs along the bottom of the MM2 screen. Choose Save Movie File from the File menu and choose My Computer, Next. Name your file, indicate a location for it, and click Next.

The default setting in the next window simply has MM2 turn the film back into a WMV file. Click the Show More Choices link; now you're playing with power. Click the Other Settings radio button to activate a drop-down menu filled with format choices. Most of these choices offer different levels of compression and video quality, in order to make the film suitable for different circumstances. Click any of the choices and look to the bottom of this window. The Setting Details box outlines the basic properties of each choice, including bit rate and display sizes. These are especially helpful for LAN managers who want to post a Photo Story to an internal network for retrieval or Web masters who want to stream the slideshow onto the Web. To the right, you will find an estimated file size for your project if you encode it in the current format. Choose your format and click Next to start the encoding process.

Some users report that WMV files made in Photo Story do not play reliably on earlier versions of Windows Media Player. They often replay the audio track without the video. If this is the case, try converting the Photo Story to the Pocket PC format. The re-encoding process does diminish the visual quality, but it converts the slideshow into a WMV file that uses a codec that is common to earlier Media Player versions.

Sound Check

After encoding a project, MM2 gives you the option to play the resulting file. We recommend you do this to get a sound check. A frequent problem in converting Photo Story formats via MM2 is



With a DVD-writing program such as Sonic's MyDVD, you can build a navigable DVD of digital still slideshows out of Photo Story or Movie Maker 2 files.

that the audio track will disappear. We had this happen to us inexplicably across different conversions of the same project. The most reliable fix we found was to fiddle with the Set Audio Levels slider. Look for this icon at the far left atop the storyboard. In our experience, this slider has no effect on the audio levels on clips that have audio tracks already embedded. But we did find that preserving the audio track on a Photo Story conversion works best when you pull the slider back from its maximum setting. One notch down from max is sufficient.

Go To DVD

Although MM2 itself cannot burn your Photo Story onto a DVD, it can convert the file to a format that makes it easy for most third-party programs to do so. To do this, start the Save Movie File process outlined above, choose the DV-AVI (NTSC) format, and write the file to a convenient location.

We used Sonic's MyDVD program as our burning tool, but Nero 6 and Roxio's Easy CD & DVD Creator 6 also write DVDs. In the MyDVD screen, simply use the Get Movies command to import the AVI file you just made in MM2. The program automatically makes your Photo Story title page into the image for the DVD's main menu button. With a blank DVD in your burner, simply click the Burn button to make a disc. If the stars are aligned properly, and your DVD format is compatible with your home DVD player, you should be able to run your Photo Story on your TV.

Keep in mind a few things about burning to DVDs. You have a lot of room there: 4.7GB to be exact. It makes sense to combine the slideshow-making capabilities of Photo Story and MM2 with the storage and navigation capabilities of a DVD to make a library of slideshows. In MyDVD, simply use the Get Movies command to pull in more AVI or WMV files. The program automatically makes a top-line menu button for each slideshow.

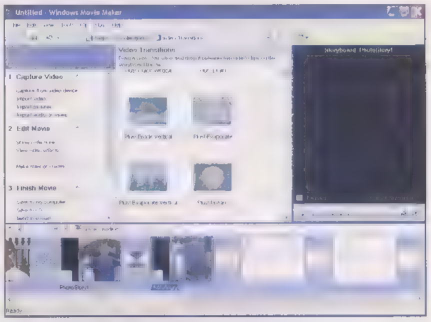
Finally, some DVD encoders such as MyDVD will convert your Photo Story WMV files directly to DVD formats, so experiment with the program's ability to import and transcode the files without using MM2 as a converter. Use the Preview mode button beneath the main window and click each of the main menu navigation buttons to make sure that the video and audio have been properly preserved from the original. Of course, converting Photo Story files directly to DVD in this way does not let you edit the projects more precisely in MM2, which is where the fun comes in.

WinXP Tip Of The Month

Do More With Images

WinXP has a built-in screen saver that displays your own digital images in a customizable slideshow. Right-click any area of the Desktop and choose Properties to open the Display Properties dialog box. On the Screen Saver tab, use the Screen Saver drop-down menu to choose My Pictures Slideshow. By default, WinXP will use whatever images already reside in the My Pictures folder.

To change the default folder and other slideshow attributes, click Settings. In the My Pictures Screen Saver Options dialog box, use the sliders to adjust how long each image remains on-screen, as well as the amount of screen space it occupies. Below these sliders you can click the Browse button and direct the screen saver to use images in any other folder. ▲



By splicing your Photo Story slideshow in just the right places, you can replace the standard fade transitions with much more diverse Movie Maker 2 transitions.

Slideshow Epics

Photo Story has a natural limit of 150 images per show, so if you are interested in really boring the neighbors with your entire vault of digital media, you can use MM2 to splice together one or more lengthy Photo Story files into a slideshow epic. Simply import the multiple Photo Story films and drag and drop them in order onto the storyboard. Convert the project into the file format you like. The main reason for converting Photo Stories via MM2 is that the movie editor lets you add video effects, better audio accompaniment, titles, and transitions that Photo Story does not allow.

Let's say that you like the animated zoom effects that Photo Story puts into these shows, but you want to add fancier transitions. Here is the trick. Put your entire film into the first spot on the storyboard and start playing the clip in your preview screen. Pause the clip in the middle of the fade between two slides. Now, use the

Previous Frame (ALT-Left arrow) and Next Frame (ALT-Right arrow) buttons to locate the frame between your two slides that is either totally black or the dimmest. At this point, use the Clip button farther to the right (CTRL-L) to divide the film at this frame, leaving the part before the clip in the leftmost slot of the storyboard and the rest of the film in the right.

Choose Video Transitions from the Tools menu. This will bring up a host of transition choices above your storyboard. Find the transition you like and drag it into the small square between the two clips in the storyboard. Once you have your first transition done, highlight the remaining film in the rightmost slot of the storyboard and click the Play button to start the clip and advance to the next slide transition, where you can splice the film again, as we did above, to create your next space to insert a MM2 transition.

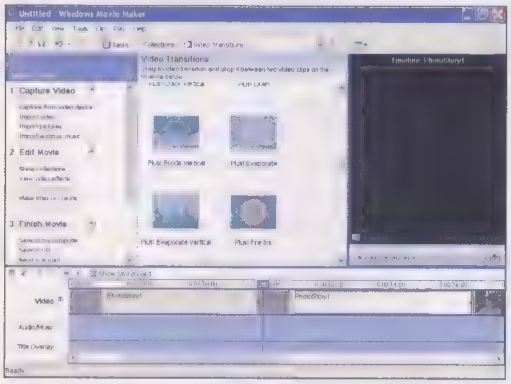
Registry Tweak
(All Windows Versions)

Trim IE's Right-Click

As you install more add-ons to your IE Web browser, your context (right-click) menu can grow uncontrollably, making it harder to find and use the commands that are most important to you. You can trim the context menu in IE6 by going to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\INTERNET EXPLORER\MENUEXT. Each subkey beneath this key corresponds with a single item on the menu. Simply highlight and delete the ones you don't want, and the menu item will not appear after you reboot. ▲

Trim & Tuck

In most cases, the transition effect you insert between clips will mask the original fade effect from the Photo Story. In many cases, however, you will not be able to locate a black or dim frame in the middle of the fade effect. We found that if you actually make your splice at the frame in which the next slide starts to fade in and then insert a transition effect between the two pieces, the new transition will still mask the original fade effect.



Video Transitions

Drag a video transition and drop it between two video clips on the timeline below.

The timeline view in Movie Maker 2 lets you trim just a few frames off of a clip so you can position your transition effect at just the right spot.

If the fades are still giving you trouble between the Photo Story slides, you can use the MM2 timeline to actually trim a few frames from the beginning and end of a clip. Above the storyboard, click the Show Timeline button. This will show each clip as a distinct box on a timeline. To get a better view of the short clips in a slideshow, use the Zoom button atop the storyboard to enlarge the timeline for more precise positioning.

Click and drag the blue rectangle at the top of the timeline to advance anywhere in your film. A pop-up box will tell you at any point in the timeline how many minutes and seconds you are into the film. If a particular fade-out effect at the end of a clip is intruding on your transition, position the timeline at the point in the clip where you want it to end and where you want the transition to start. Note the duration time that you will see in the pop-up box. This is the point on the timeline at which you will want the current clip to stop. Now move the pointer over the existing end point of the clip in the timeline until you see red arrows pop up. Click and drag the end point of the clip to the left.

Use the time counter in the pop-up box to locate the cut point you decided on earlier with the blue timeline marker. Let go of the mouse button when you have moved the clip line to the minute and second where you want that clip to end. This will shorten the clip and trim any messy fade effect. Now you can switch back into storyboard mode (the button atop the timeline) and insert new MM2 transitions. Remember that you can back out of bad splices and trim with the Undo command (CTRL-Z).

Keep in mind that whenever you trim a Photo Story video file you are also trimming the audio track, which will create a fractured sound track. If you mean to fiddle with a Photo Story in MM2, we suggest you start with a Photo Story without narration or background music. As we will see next month, it is easy enough to add these tracks in MM2 itself after all your trimming and transitioning is over. Next month we'll also see how you can use Movie Maker 2 to make a slideshow from scratch with a range of different and even better effects than many Photo Story slideshows. CPU

by Steve Smith

Infinite Loop

Board Up Your Homes!

Late in the summer, there were two things many Americans especially feared: Hurricane Isabel and telemarketers. The week of Hurricane Isabel, Weather Underground (www.wunderground.com) saw a 92% increase in its Web traffic. The week of the FTC's deadline to join the later-tied-up-in-court Federal Do Not Call List, traffic to the FTC's site (including its www.donotcall.gov page) jumped 665%.

Source: Nielsen//NetRatings

WARM UP TO PENGUINS

Distributions On Bootable CDs

A GROWING NUMBER OF LINUX DISTRIBUTIONS THAT YOU CAN RUN FROM A CD RATHER THAN A HARD-DRIVE INSTALLATION ARE POPPING UP.

These "bootable" distributions, as they're often referred to, are becoming a vital component in many Linux users' and administrators' rescue and backup toolkits, as well as becoming popular among those who want to use Linux wherever they are without having to find a computer to do a complete install on.

The following is a look at some of the bootable distributions now available. Some are specialized for particular situations; some are desktop solutions with an amazing number of apps included.

Dyne:bolic

Dyne:bolic (www.dynebolic.org) is a distribution that's educational, even just from the standpoint of viewing the tools that come with it. Both the audio and video sections include multiple programs for playing, recording, editing, streaming, and veejaying or deejaying. With a portable storage unit, such as a hot-pluggable hard drive, you're a walking content producer ready to leap into action.

For those not fond of just wandering their way through the context menus, there are manuals in HTML and PDF formats. In some cases, sections of these manuals only point you to where to find more information, but sometimes that's all you need. Hopefully the documentation will continue to expand as Dyne:bolic also expands.

The only problem we found with Dyne:bolic is that it was rather fussy about hardware. We had to try four different machines before finding one that would properly boot with version 1.1 of this distribution, so don't just assume that it will run on any computer until this platform matures further. If you need to use this distribution on a particular computer, test it first.

FIRE

As the name FIRE (Forensic and Incident Response Environment; biatchux.dmzs.com) suggests, this bootable distribution (a $10 donation gets you a CD version) isn't so much intended to run as a general desktop app as it is intended to give you a secure, well-equipped platform from which to inspect, investigate, and recover problem systems. FIRE is a young distribution, so don't expect a large feature set or lots of bells and whistles outside of its primary function.

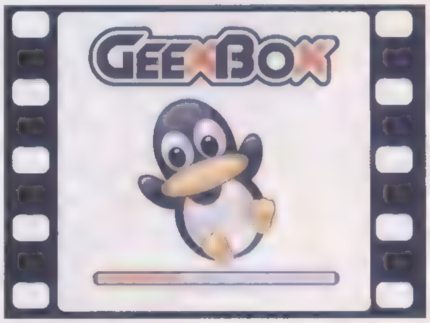
If you want to boot into the GUI, type **fire-X** at the boot prompt. Even if you have no need for a tool such as FIRE now, a tour of the apps that it offers is an eye-opener for what will be available when you do have a need. When it comes to computer security, it's far better to select some key tools ahead of time rather than scramble at the last minute while an intruder digs further into your machines.

If you are familiar with the VNC (www.realvnc.com) remote-management tool, you'll be pleased to learn that VNC comes with FIRE. You can use VNC to access servers from your office and access the list of other apps by selecting the Tools Available link and choosing the type of tool you're looking for.

In addition to these investigations, read the FAQ on the main FIRE site, which will tell you the default root password (which you should change immediately) along with how to load the non-GUI configuration menu.

GeeXBoX

Looking for a Linux-based media center? The legalities are still a thorny issue for Linux users in the United States when it comes to DVDs, but GeeXBoX (www.geexbox.org) can handle many forms of streaming media (including audio and video) and other digital formats. Think of the distro as an entertainment center on a CD. Users who have complained in the past that Linux media doesn't play nicely will be pleased to see what a tiny RAM-stored distribution can do for this issue.



GeeXBox with Scribus, a desktop-publishing application, running.

While you'll want to just burn the default ISO to CD at first, you may find you have to generate your own specialized ISO to support all your hardware and needs. For one thing, you'll have to manually add codecs for RealMedia and Windows Media due to licensing issues. Fortunately, GeeXBoX comes with an ISO generator to help you with your customizations. Be sure to read the Documentation section first.

Linux Kernel 2.6 Is Coming

Rumors that a new Linux kernel is on its way rarely fail to get people excited. After all, everyone has their own pet feature they want to be able to use more easily. In October, kernel 2.6 reached a point of "feature freeze," meaning it's time to get everything that's already in the experimental 2.5 version tested without adding any new variables to the mix. This lets the official 2.6 kernel mature more rapidly, often within a few months.

Some of the features that end users are looking forward to include stable support for Athlon 64 processors, the ability for applications to ask the kernel to halt a complex process for a short period so they don't slow down for the user, more efficient handling of multiple resource-intensive processes at once (which will make users who run many programs at the same time very happy), more efficient handling of drivers and other kernel modules, USB 2.0 support, the ALSA (Advanced Linux Sound Architecture) sound system, and native support for a larger number of hardware devices.

There's little doubt many distributions intend to roll out new releases as soon as possible—or at least updates—with the 2.6 kernel once developers feel comfortable with it. As for when to expect kernel 2.6, we don't want to risk teasing you with a premature guess. Just pick your favorite Linux news source and watch carefully. You'll see and hear the cheering when 2.6 comes out. ▲

If you find that having to use a keyboard for your media center isn't to your liking, you also have the option of enabling infrared device support. See the GeeXBox Web site for more on the devices supported. (We expect each new release will improve the list of GeeXBox-friendly hardware.)

Just imagine, next time you have a party and people compliment you on your entertainment setup, you can point out that it's running under Linux.

Knoppix

One of the most commonly mentioned Linux desktop solutions you can run directly from CD is Knoppix (www.knoppix.org). With support for creating a permanent home directory on just about any removable media, including USB key chains, Knoppix gives you a portable environment and ability to store data, too. Just select the Knoppix main menu and select Configure -> Create A Permanent Home Directory. If this data is private in nature, take advantage of the ability to encrypt it in case you lose that key chain or someone else manages to access your permanent Knoppix directory.

The default language and keyboard layout for Knoppix is German, which makes sense considering Knoppix is a German distribution. If you want a different language and keyboard layout, press F2 when you see the Knoppix boot prompt. To use English with a U.S.-based language keyboard setup, type **knoppix lang=us** at the boot prompt.

If you create a permanent home directory, as well, you might type **knoppix home=scan lang=us.** When you have your system up and running, you will discover an amazing wealth of available programs. Not only does Knoppix include such typical desktop applications as OpenOffice.org, it offers tools required for computer rescue and backup.

If you only want to deal with one bootable distro, Knoppix is a good choice.

Summing Up

If you like the idea of a bootable Linux distro but aren't keen on any of the ones we've detailed, check out DistroWatch.com. Go to the CD-based distributions section, and the pointers available just on this one site might amaze you. You will also notice that there's often more than one bootable distro available in a category. For example, for a simple bootable desktop you can use Knoppix, LindowsCD, SuSE Live Evaluation CD, and others. CPU

by Dee-Ann LeBlanc

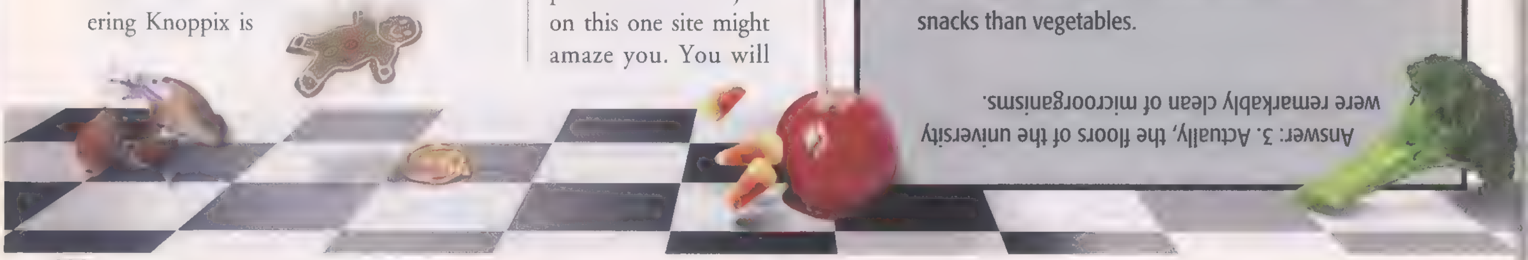
Infinite Loop

Five-Second Myth

If you're not familiar with the five-second rule, it states that if you drop an object on the floor, it's safe to eat it provided it doesn't stay on the floor more than five seconds. A high-school senior, Jillian Clarke, found during a seven-week internship at the University of Illinois at Urbana-Champaign that E. coli does, in fact, transfer to tasty treats within five seconds. In addition, she noted that more E. coli transfers from a smooth surface to a smooth snack. Can you guess which of the following Clarke's report didn't find?

1. The five-second rule dates back to Genghis Khan.
2. Women are more likely than men to invoke the five-second rule.
3. University campus floors provide fertile breeding grounds for microorganisms.
4. The five-second rule is invoked more often for sweet snacks than vegetables.

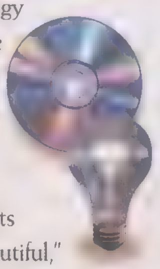
Answer: 3. Actually, the floors of the university were remarkably clean of microorganisms.



PROOF
THAT *great* IDEAS GET HEARD.

HONORED BY *FORBES ASAP* for CHANGING THE WORLD.

Forbes ASAP magazine rated the **Bose® Wave® radio** right up there with the light bulb, the compact disc and the telephone. Only fifteen inventions made their exclusive "All-Time A-List" of technology breakthroughs that have changed the world, and the Bose Wave® radio is one of them.



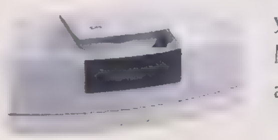
Recognizing products "both functional and beautiful," *Forbes ASAP* credits Bose with managing to fit "really big sound into a really small – and pretty – package."

LIFELIKE SOUND

The secret is the Bose acoustic waveguide speaker technology built into the Wave® radio and Wave® radio/CD (shown above). This and other patented Bose technologies deliver rich, full sound with remarkable clarity and deep lows. It's sound you'd never expect from a system this small.

HEAR *the* DIFFERENCE

The Wave® radio and Wave® radio/CD are available directly from Bose, the most respected name in sound. Our risk-free, 30-day, in-home trial guarantees your satisfaction. Order before December 31, 2003, and enjoy **no-interest financing until January 2005.*** Plus, **shipping is free.** And if you order now, you'll receive a free Bose Multimedia Pedestal – a $99.95 value.



Wave® radio/CD with Multimedia Pedestal

You have to hear the Wave® radio/CD for yourself. So call today. Because the proof is in the listening.

Free Bose Multimedia Pedestal
when you order before December 31, 2003.

It easily connects your Wave® radio/CD to sources like a TV, VCR and DVD player simultaneously, turning your system into a versatile audio center at the press of a button.

Call Today
1-800-925-9738
ext. TC679

For information on all our products:
www.bose.com/tc679

Please specify when ordering:
Wave® radio/CD: ☐ Platinum White or ☐ Graphite Gray
Wave® radio: ☐ Platinum White or ☐ Graphite Gray

(Mr./Ms./Mrs.)
NAME ADDRESS

CITY/STATE/ZIP

DAY PHONE EVENING PHONE

E-MAIL ADDRESS (OPTIONAL)

Mail to: Bose Corporation, Dept. DMG-TC679
The Mountain, Framingham, MA 01701-9168

BOSE®
Better sound through research®

---

*On your Bose Preferred Customer credit card subject to credit approval. This is a Same As Cash promotion. If balance on these purchases is paid in full before the 1/05 promotional expiration date indicated on your billing statement and your Account is kept current accrued Finance Charges will not be imposed on these purchases. If balance on these purchases is not paid in full, Finance Charges will be assessed from the purchase date at the variable Standard Rate APR of Prime Rate + 12.5 percentage points (19.8% as of 8/31/03). For Accounts not kept current, the variable Default Rate APR of Prime Rate + 16.5 percentage points (23.8% as of 8/31/03) will be applied to all balances on your Account. Minimum Standard APR 19.8%. Minimum Default APR 23.8%. Minimum monthly payments are required. Minimum Finance Charge $1.00. Certain rules apply to the allocation of payments and Finance Charges on your promotional purchase if you make more than one purchase on your Bose Preferred card. Call 1-888-367-4310 or review your cardholder agreement for information. ©2003 Bose Corporation. Patent rights issued and/or pending. The Wave® radio design is also a registered trademark of Bose Corporation. Financing, free shipping and free Pedestal offers not to be combined with any other offer or applied to previous purchases, and subject to change without notice. If Wave® radio is returned, Multimedia Pedestal must be returned. Risk free refers to 30-day trial offer only. Delivery is subject to product availability. Quote is reprinted with permission: Forbes ASAP (in reference to the original Wave® radio), 11/27/00.

Shavings From The Rumour Mill

by Mike Magee

Intel Piggybacks Over AMD's Hot Dogs

I did the Computex trade fair in September and almost cut myself shaving, the rumour mill was churning so fast. No one from Intel's press team ever told us, but the chip giant recruited 218 engineers to start a CPU design center there the month before. You've all heard the rumours about Intel building a chip so that it will work just like an AMD Athlon 64 chip? The Taiwanese Intel guy was singing like a canary that had millet spiked with speed and confirmed everything that had been rumour-milled and more.

This 775 socket land grid array stuff that we wrote about earlier this year is going to come earlier than expected, and it will have holes in the top (an extra socket if you will), and you'll just be able to clip it on the top, and hey, presto, abracadabra, your future Intel chip technology will work with X86 instructions, too. Or not. Well, it all depends on whether AMD's Athlon 64 is a success or not. If it is, and believe you me that Intel is terrified of the possibility the Pentium V, if that's what it's called, will work just fine and dandy with a new version of Windows 64 (codenamed Elements). We could hardly believe our ears were transmitting the right signals to our brains except that the very latest Intel roadmaps we saw suggest that its next-generation processor will be modular. And Intel's Prescott is not the Pentium V, although the land grid array socket will be coming sooner than anyone thinks.

> **You've all heard the rumours about Intel building a chip so that it will work just like an AMD Athlon 64 chip?**

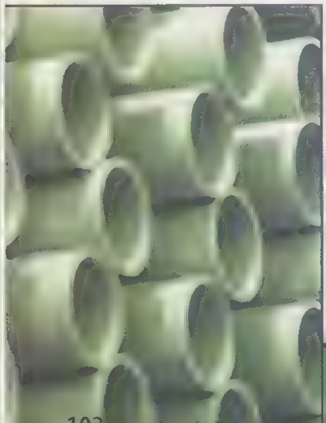
Maybe you know that when Intel makes these changes, it does so on its own terms, under its own conditions, and its partners, the motherboard makers, are apt to feel all unloved and unwanted. You know what they do then? They react like big babies in big prams, and their toys litter the booths of Computex while they scream and scream that they're being treated unfairly. And like any big baby, once you start them off, it's hard to calm them down. I have some sympathy for the poor devils. After all, they didn't know that Intel was going to change the socket rules all over again, thus making their current plans look out of date after they'd spent the money on research and development. "Intel doesn't care," they wailed. Intel doesn't care. And by the way, AMD doesn't either. Eh? Oh yes, the mobo makers were also very upset because although Computex coincided with the launch of the Athlon 64, AMD apparently didn't supply enough chips to have working systems at their booths. Why? No one knows, but one big motherboard maker that you would no doubt recognize if we named it, left future AMD roadmaps in our not-so-tender care by mistake <coff> on purpose.

I took refuge from this crazy melee at a rather posh dinner that VIA organized, except someone sidled up to me and showed me VIA's NanoC3, a tiny little 1GHz microprocessor measuring a rather impressive 15mm x 15mm. The guy who showed me the processor was like one of those geezers in foreign climes that asks you if you want . . . well, name your vice. But what he said about this chip that was half the size of the current Intel Pentium M totally galvanized me. He said that if some wizard of a chipset merchant put together an X86 sort of motherboard that supported multiprocessing, you could fit four of these babies into the space an AMD or an Intel single processor took up, plus you wouldn't need much fanology to keep the little imps cool. So how does it all compute? My goodness me: All VIA has to do is pierce a few holes in the top of four tiny C3 chips and bolt on an X86-64 compatible instruction set, and we'll end up with a real choice of microprocessors again. Let's hope the software keeps up with these brilliant chip designers, eh? ■

Send rumours to "Mad Mike" Magee at Mike@cpumag.com.

Holiday Wish List

1. High fidelity wireless loudspeakers
2. Hotspots everywhere
3. Infrared returning to notebooks
4. Roadmaps you can read
5. A mobile phone that works everywhere
6. An inkjet printer with a big inkwell
7. An OS with no helpfiles
8. A PDA with a fold out 10-inch screen
9. RF ID chips for pen computing
10. An MP3 player that is cheap as chips



Technically Speaking

An Interview With Don Woods, The Man Who Gave Gaming Adventure

With today's 3D graphics, cinema-like audio, and rich story lines, it's hard to fathom that computer gaming started in the 1970s with interactive text games. No explosions. No joysticks. No high scores. Just text descriptions that completely immersed players. Don Woods played a key role in showing the power of computer gaming in 1976, developing and distributing a game called Adventure (sometimes called the Colossal Cave Adventure game), in which players solved puzzles while working their way through a cave created in the player's imagination completely from text descriptions. It may not have been the first computer game, but it was the first that became a huge success, passing from player to player through the forerunner to the Internet, ARPANet. For many programmers through the late 1990s, playing Adventure was an introduction to computing. ▲

by Kyle Schurman

CPU: Let's discuss the development of Adventure. Will Crowther developed the original Adventure game, and you greatly expanded it, increasing its popularity. When you initially saw the game on ARPANet, what made you to want to expand it?

Woods: Like a lot of other people who've come after me, I found it fun to play. I'm sure different people have different views as to why they found it fun, but I enjoyed wandering around and doing the exploration. There wasn't a lot of the puzzle solving to Crowther's version. There were five treasures that were sitting out where you could pick them up and take them back. The only one that presented any problem was the gold nugget. But it was still fun exploring and reading the descriptions. Then there were places in the program where, frankly, there were bugs. You could go to a location and find yourself unable to move from it. No direction worked; you were just stuck, and you had to quit and get out of the game. I felt it'd be nice to clean up these rough edges. And I had some ideas for additional treasures you could add and make them a little more challenging to figure out how to get them out. I just kept coming up with ideas, and I had the combination of wanting to fix the problems and then having ideas for wanting to expand it.

CPU: Had you seen anything like it at the time?

Woods: The closest thing I'd seen to something like it before was the older game called Hunt The Wumpus. I had run into it on the original Unix system coming out of Bell Labs. The way it worked was it was all done in an abstract way. You were in a cave, but there were no pictures or descriptions. You were in a cave with 20 rooms, numbered one to 20. Somewhere in this cave was a monster called the Wumpus. You were trying to find it by shooting arrows along the cave paths because if you actually walked into the room with it, it would eat you. You got warnings as you got closer: 'I smell a Wumpus.' You sort of knew you were getting close, but the cave interconnected a lot, so you couldn't be sure which path led to it. Plus there were pits that you could fall into, and there were bats that if you ran into them, they'd pick you up and drop you into a new random location in the cave. Like I said, it was an abstract game, but I had fun with the exploration element. You could sort of visualize it. But that was the closest I had run into before. There were role-playing games out, too, like Dungeons & Dragons, which was still fairly new at the time, but it was available. I believe Crowther's group had encountered it. But I had never heard of it, and I was unfamiliar with role-playing games themselves. It was probably because of my experience with Adventure that people invited me into their role-playing games.

CPU: While you were working on Adventure, did you have a sense that it was going to be a groundbreaking piece of software?

Woods: Certainly not at first. I got a copy of the source from Crowther, worked on it a bit, and eventually made it available. I created a special account on the computer system at the Stanford AI Lab to allow people to log in over the ARPANet and play it, if they wanted to. I sent out some messages, just to let people know it was there. Then I took off for spring break. While I was on spring break, I checked my mail, and I had gotten some angry messages from the [Stanford AI Lab] computer administrators, saying that the system was bogged down from people playing this game. [Laughing] At that point, I began to have a clue about what I might have here.

CPU: We've read that work at companies and universities would come to a standstill for several days while players worked their way through the game. What's your favorite story about people playing Adventure?

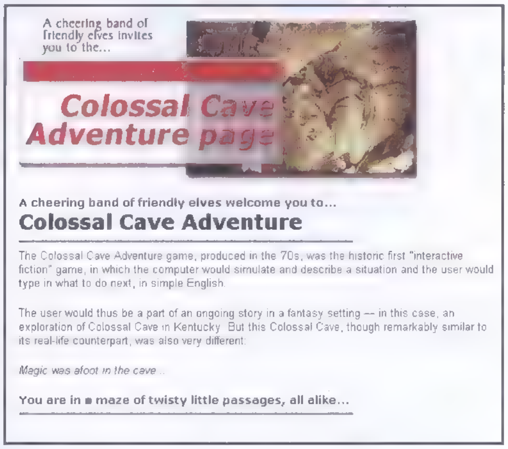
Woods: Certainly, one was the initial overloading of the first machine, and that was before I began sending out copies of the source and shutting down other companies' machines. [Laughing] That came later. No work was done over the course of a week or two. All of the programmers at a company would eventually get addicted, work their way through the game, finish it, and be done with it and get back to work. And I've heard individual stories about people being in the MIT computer lab on a Friday night, being introduced to the game, and they just wouldn't leave until some time late Sunday night.

CPU: We've also read that you and Crowther never received large payments for developing Adventure, but someone once bought you dinner for the game?

Woods: What would actually happen occasionally would be someone would ask me for a copy of the source, and I'd say, 'Send me a magnetic tape or something (we didn't have floppy disks yet), and I'll put a copy of it on the tape for you. Just make sure you pay me enough to cover postage.' Sometimes people would throw in an extra $10 or $20, tops. I've never made much off of it, and, of course, I never licensed it directly. There was one version put out by Software Toolworks where Crowther and I got paid a licensing fee for our endorsement of their version of the game.

CPU: Do you regret not commercializing Adventure more? Then again, commercialization was not really part of the Internet culture at that point, was it?

Woods: It wasn't part of the culture, but that doesn't mean I don't regret it sometimes. But I sort of look at it pragmatically: If I had tried to get some money out of it, I suspect it wouldn't have become as popular as it did. The fact that it was available everywhere because it was free was part of why it took off.



A cheering band of friendly elves invites you to the...

Colossal Cave Adventure page

A cheering band of friendly elves welcome you to...

Colossal Cave Adventure

The Colossal Cave Adventure game, produced in the 70s, was the historic first "interactive fiction" game, in which the computer would simulate and describe a situation and the user would type in what to do next, in simple English.

The user would thus be a part of an ongoing story in a fantasy setting — in this case, an exploration of Colossal Cave in Kentucky But this Colossal Cave, though remarkably similar to its real-life counterpart, was also very different:

Magic was afoot in the cave ..

You are in a maze of twisty little passages, all alike...

Check it out yourself: www.rickadams.org/adventure.

CPU: The Adventure game appears to live on through the Colossal Cave Adventure page (www.rickadams.org/adventure). Is the game on that page pretty true to what you developed?

Woods: I believe so; I poked my way through it. I don't think I have played through his version completely, but my recollection is it is pretty much the original.

CPU: When was the last time you played or worked on the game?

Woods: Oh, gosh, it's been a while. It's certainly been a while since I worked on it. I converted it from the original Fortran over to C, so I could compile it on more modern machines, and every once in a while, I played through a few turns of it, just to make sure it worked on some new system where I've migrated. It's been a long time since I played my way all the way through.

CPU: You also co-authored "The Hacker's Dictionary," among other projects, correct?

Woods: That actually grew out of the ARPANet. Raphael Finkel, who wasn't really part of the computer department but was at the AI Lab for some of his research, began keeping track of some of the unusual words that the other people there would use—the computer jargon of the day. He began keeping a file of it for his own interests to start up this vocabulary of words that were used in a special way. Somebody at MIT apparently was doing something similar, and they found out about it, so they merged their files. After that the file was maintained jointly at their sites. Then CMU [Carnegie Mellon University] got involved, as well. It sort of evolved from there. There were about half a dozen of us who helped contribute to it and maintained the consistent format and checked for cross-references and dealt with other issues.

CPU: What do you like about today's computer gaming? Do you play a lot of computer games?

Woods: Not too many. Generally, if I play a computer game, I'll get hooked for a while. There have been some that I'd play for a while and then get frustrated because there would be problems. But they're incredibly addictive. I have to watch out that I'm not staying up until 6 in the morning playing the things if I get started on them.

To read our entire interview with Don Woods, go to
www.cpumag.com/cpudec03/woods

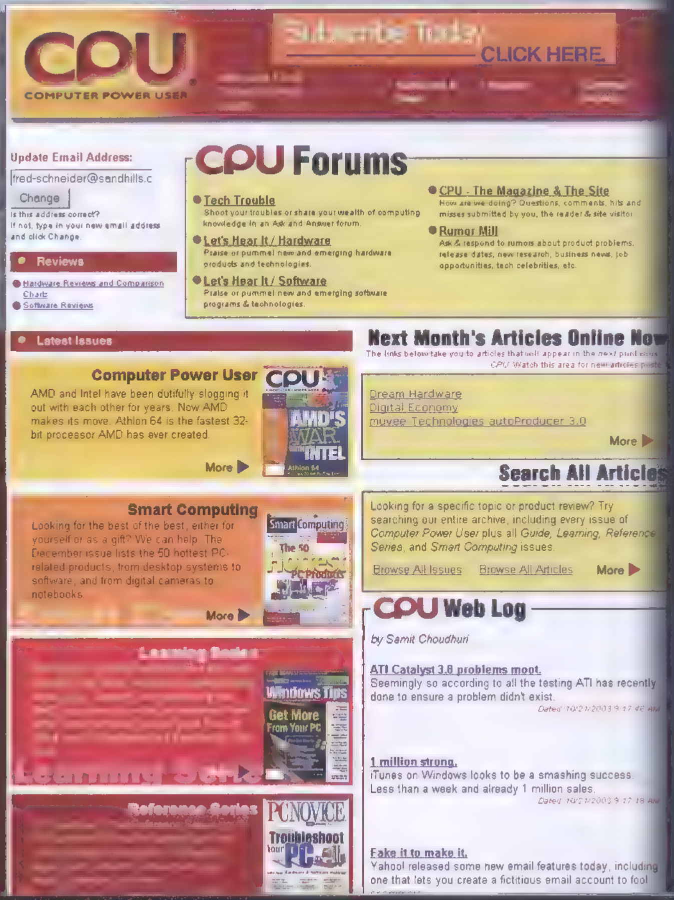
What's Everyone Talking About?

ComputerPowerUser.com

Take Advantage Of All The Extra Benefits Of Being A Paid Subscriber Today!

Here's what's available to everyone:

- The CPU Web Log. Each weekday, our editors scour the Web to bring you the best high-tech (and occasionally offbeat) information in an entertaining way.
- Forums to share (or show off) your thoughts and expertise. Great whether you know it all or want to know more.



Update Email Address:

fred-schneider@sandhills.c

Is this address correct?
If not, type in your new email address and click Change.

Reviews

- Hardware Reviews and Comparison Charts
- Software Reviews

CPU Forums

- **Tech Trouble** Shoot your troubles or share your wealth of computing knowledge in an Ask and Answer forum.
- **Let's Hear It / Hardware** Praise or pummel new and emerging hardware products and technologies.
- **Let's Hear It / Software** Praise or pummel new and emerging software programs & technologies.
- **CPU - The Magazine & The Site** How are we doing? Questions, comments, hits and misses submitted by you, the reader & site visitor
- **Rumor Mill** Ask & respond to rumors about product problems, release dates, new research, business news, job opportunities, tech celebrities, etc.

Latest Issues

Computer Power User
AMD and Intel have been dutifully slogging it out with each other for years. Now AMD makes its move. Athlon 64 is the fastest 32-bit processor AMD has ever created.

Smart Computing
Looking for the best of the best, either for yourself or as a gift? We can help. The December issue lists the 50 hottest PC-related products, from desktop systems to software, and from digital cameras to notebooks.

Learning Series

Reference Series

Next Month's Articles Online Now

The links below take you to articles that will appear in the *next* print issue of *CPU*. Watch this area for new articles poste

Dream Hardware
Digital Economy
muvee Technologies autoProducer 3.0

Search All Articles

Looking for a specific topic or product review? Try searching our entire archive, including every issue of *Computer Power User* plus all *Guide*, *Learning*, *Reference Series*, and *Smart Computing* issues.

Browse All Issues   Browse All Articles

CPU Web Log

by Samit Choudhuri

ATI Catalyst 3.8 problems moot.
Seemingly so according to all the testing ATI has recently done to ensure a problem didn't exist.
Dated 10/21/2003 9:17:46 AM

1 million strong.
iTunes on Windows looks to be a smashing success. Less than a week and already 1 million sales.
Dated 10/21/2003 9:17:18 AM

Fake it to make it.
Yahoo! released some new email features today, including one that lets you create a fictitious email account to fool

Subscriber Tip Of The Month

The CPU Forums offer a great place to boast and brag about your latest creation or success, or a place to vent or ask for sympathy about your computer dramas. Some of our 'resident experts' might even be able to lend a hand with some advice or just give you their two cents' worth!

Only paid subscribers to *CPU* magazine get complete access to all these great features:

Latest Issues. Get a guided tour through the latest editions of our technology publications.

More hands-on hardware reviews. Are the latest products worthy of the marketing hype? We put products to the test, complete with comparison charts and links pointing to where you can buy the products online.

Even more great reading. Our Web site features every article from *CPU* and a searchable archive of more than 19,000 articles from our sister publications *Smart Computing*, *Learning Series*, *Guide Series*, and *Reference Series*. It's like getting five magazines for the price of one!

A showcase of articles from next month's issue. Impress your friends with all the insider information you get by reading *CPU's* latest articles and product recommendations before they're available in print.

CPU
COMPUTER POWER USER

What's Cooking . . .

Under Development

A Peek At What's Brewing In The Laboratory

STM Puts New Power In Your Pocket

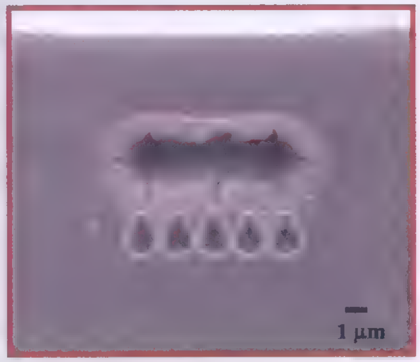
Today, many cell phone users feel lucky to get three days of standby time from their phone's batteries. STM (STMicroelectronics) thinks it can boost that number to three weeks with the help of a research breakthrough in fuel-cell designs.

In case you've missed the buzz over the last five years, fuel cells, like batteries, generate energy via electrochemical reactions rather than combustion. However, fuel-cell reactions take place between hydrogen and oxygen, producing heat, electricity, and clean water as byproducts. The principle behind most fuel cells is to place a membrane between two electrodes. The membrane allows hydrogen ions to pass between the electrodes but not electrons, and the membrane acts as a proton conductor. Platinum and other catalysts are often used to increase reaction rates and the amount of energy produced.

One of the limiting factors on fuel-cell-energy output is the amount of surface area between the electrodes and the membrane, which is why fuel cells currently being designed for cars are so prohibitively large. Cell phones generally operate at 300mA of current at 3.6V. With conventional fuel-cell approaches, a battery would need about 60 square centimeters to produce this much electricity, and cell phone batteries need to stay under 12 cubic centimeters. STM researchers dramatically increased the surface area available by devising a 3D structure with thousands of microchannels. Moreover, the team successfully moved the process into porous silicon, which in a sense is riddled with pockmarks, thus substantially increasing the surface area in contact with the catalysts.

Interestingly, STM's fuel cell would complement existing cellular batteries, not replace them.

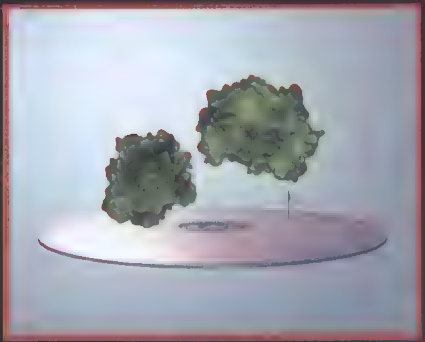
"The fuel cells will be approximately 10 cubic centimeters in volume, and they should be able to power the phone in standby mode for at least 20 days," says Salvo Coffa, director of silicon technology, optoelectronics, bioelectronics, and nanorganics, corporate R&D for STM. "The cell will deliver around 300mA of current at 3.6V, which is approximately 1W of power. A key point is that power management in a mobile phone clearly suggests the use of a hybrid approach in which a small battery is used during calls, while the fuel cell recharges the battery and takes care of power requirements when the phone is in standby mode. When in call mode, the phone will demand peak current/power use, which the standard battery will have to handle." ▲



This ST cross-section analysis shows a buried gas channel surrounded by a porous Si layer. The channel typically conveys hydrogen for the fuel cell's chemical reaction, and the porous lining allows for a very high surface area.

Screen Molecules With A CD

Even undergrad biology students know that lasers are often used to detect certain molecules. However, chemist James La Clair, a visiting scholar at the University of California, San Diego, discovered a way to turn a six-figure detection process into something practically everyone could afford.



UCSD researchers have shown how molecules attached to CDs can screen for proteins.

(Photo courtesy of Nina Seiler, UCSD)

His patented approach, which he's sharing with UCSD, still involves using lasers for detection, only much more common ones.

"We developed a method to identify biological interactions using traditional compact disc technology," says La Clair in a UCSD statement. "Using inkjet printing to attach molecules to the surface of a CD, we identified proteins adhering to these molecules by their interaction with the laser light when read by a CD player."

Everyone knows that scratches on CDs will produce laser-read errors. You can often hear them when playing the disc. La Clair and group developed a method for printing sample molecules in specific patterns on a CD's surface. These molecules produce very specific read errors during playback. But then a revised sample can be made in which there are unknown compounds (or a lack thereof). Because these mystery substances can bond with molecules in the original sample, those points will produce different identifiable read errors. The potential of this technology to deliver very inexpensive diagnostic medical tests is enormous.

"In theory," says La Clair, "anyone who has a computer with a CD drive could do medical tests in their own home." ▲

by William Van Winkle

Irish Smarts Meets LucasArts

Many of us remember having toy light sabers as kids. You know, those plastic flashlights with the extending colored tubes. We'd bash them around, manually supplying the “woom, woom” noises until hyperventilation set in. Imagine how much cooler that toy would have been if it had supplied authentic sound effects on its own. Mads Haahr, a scientist at Trinity College in Dublin, had the same idea. A “smart light saber” was the first application he had in mind for an app in his sensor-based ubiquitous computing research.

The smart light saber project quickly slid into a new application, however: the smart kendo sword. By implanting a series of sensors, accelerometers, gyroscopes, and magnetometers in a classic bamboo martial arts weapon, the sword can convey data to a computer to track its movements in 3D virtual space. Currently, Haahr and colleagues are at work developing a training application that will help a beginning kendo practitioner learn the basic moves.

The present sword connects via a wire to a computer the user wears on a belt. The PC in turn relays the data via 802.11b to a PC on the LAN. Haahr hopes a next-gen version will embed the belt PC and wireless transceiver within the sword.

The sword is only one project in Haahr's Distributed Systems Group. Another is a “smart couch” that detects a user by measuring his weight. Applied to an elderly person's bed, for example, such systems could signal an alert if the owner doesn't return to bed after a given time, perhaps after taking a fall.

While ubiquitous, sensor-based computing is the hot concept du jour in many R&D labs, some implementations are iffy. “People are talking a lot about smart-kitchen appliances,” says Haahr. “In one of these visions, your fridge keeps track of the expiration dates of your food, reorders items over the Internet, and suggests recipes for what you can cook with its current contents. This type of vision doesn't really cut it for me. First, I don't find the app all that compelling—I usually improvise when I cook; it's a creative process that I would not want my fridge meddling in—but more importantly, chances are the food items will have to be tagged electronically in one fashion or another. Food vendors aren't going to do this overnight, so my bet is you are going to find a smart sword in your hands before you will find a smart fridge in your home.

“Then there are, of course, the issues of privacy, which are huge,” Haahr says. “If there are sensors everywhere that track who is where and what they are doing, who owns the data and who gets access to it? Ubiquitous computing technology can be used to build an Orwellian nightmare. As researchers in this area, helping shape this technology in a way such that it benefits people and does not become a nightmare is a great challenge.” ▲

Thanks to built-in sensors and connectivity, this kendo sword from Mads Haahr's Distributed Systems Group at Dublin's Trinity College can not only help people learn the martial art but also make really cool noises when you play with it.

Sun's “Superchip” Set To Extend Moore's Law

The wires running through a processor tend to only be about one micron wide and can carry data at an incredibly fast rate. In a multiprocessor environment, however, chips must communicate across wires running through the PCB that are closer to 100 microns wide and that are significantly slower than intra-chip wiring. In effect, the PCB-level connections are a massive bottleneck that engineers have sought to overcome with cache rather than a new, superior method of interconnecting processors.

Sun Microsystems believes it has finally developed that interconnect system. The technology, dubbed “proximity communication,” allows chips to be laid down edge to edge, something like a quilt, thereby reducing the latency between signals and the power lost across each wire.

While conventional processor wiring performs at roughly 50 billion bits per second, proximity communication is expected to yield chip interconnects that approach 5 trillion bits per second. Provided that processors can keep pace, proximity communication would theoretically allow for computers running at effective speeds of hundreds of gigahertz.

By using an electromagnetic phenomenon called capacitative coupling, Sun has proven that chips can communicate between one another if positioned adjacently. The processors essentially pass data directly without a wire connecting them, a bit like the difference between talking with a person that's right in front of you vs. talking with the same person over the phone.

Although proximity-based systems may have superior throughput potential, there is a corresponding thermal problem that's left to solve. ▲

Back Door

Q&A With Peter Molyneux

Considered by many to be a god among game designers, Peter Molyneux is no stranger to mixing PCs and divinity. He is the founder of the "god game" genre, starting with the seminal Populous back in the late '80s and most recently peaking with Black & White in 2001. (Molyneux's company, Lionhead Studios, will release B&W 2 next year.) Eloquent, humorous, and insightful, Molyneux is one of the most informed and outspoken voices in the industry on gaming. Read on!

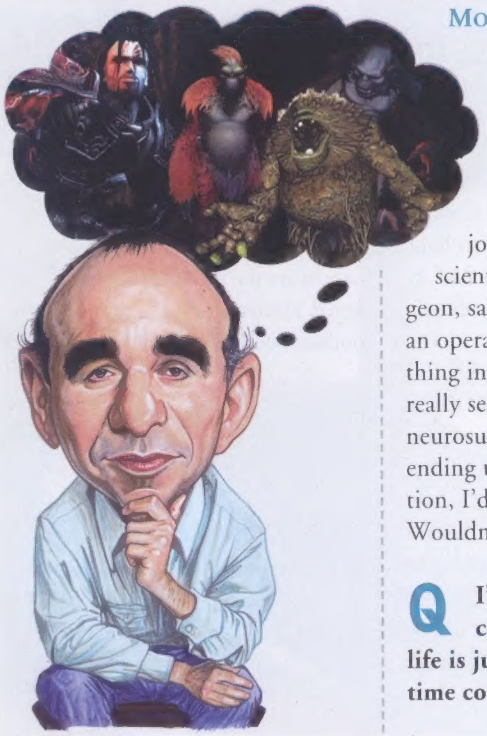
Q Is true artificial intelligence a pipe dream?

Molyneux: We could probably argue for the next six hours what AI actually means. Let's suppose that it means there is something driven by a computer acting under its own volition that has what we call emergent behaviors. It can adapt itself to different situations. Given that, I think the AI agents we're creating are able to respond to players and are able to exhibit learning. But true AI, that is, having an AI agent able to function in our world, is incredibly beyond reckoning.

Now, I will say that one day you will get to know a character within the gaming world, and that character will end up being your friend, and you will be surprised when you find out that it's not a human being. I think that could be true within the next five years.

Q Will the dominant gaming model stay local or become widely networked?

Molyneux: A lot of games will have some sort of online connectivity, and that could be from the trivial to the central mechanic. But I have no doubt that a lot of future games will be online, which is an absolute nightmare for us because, especially if you're trying to do a single-player game and multiplayer game in one package, it doubles the effort that you take to do it. It is incredibly hard to make a great single player game, and it's 10 times harder than that to make a great multiplayer game. There are so many huge design issues about culture and timing—all sorts of huge headaches.



Q What kind of culture issues?

Molyneux: In B&W 2, one of the stupid things you can do—because I love doing stupid things in games, and this is a bit of an homage to a film called "Monty Python and the Holy Grail"—is have these catapults that can storm the walls. You can put a cow in the catapult to throw over the wall. Well, we had someone over from the Indian office who was mortified. It was as if Satan himself had appeared in the game because the cow is a sacred animal in India. You can't catapult a religious icon over a wall.

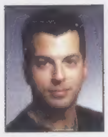
Q Think about gaming interfaces: wheels, keyboards, sticks, mice, and whatnot. Where have we missed the boat?

Molyneux: If we really want a revolution in gaming, forget about faster processors or better graphics or fantastic sound. The real innovation is going to come when we have some other device than a mouse or a joypad to play with. Now, if a scientist somewhere, some neurosurgeon, said there is a one in 10 chance of an operation being able to embed something in your head so that you could really see and feel the world in basic neurosurgery and a nine in 10 chance of ending up brain dead from the operation, I'd be the first in the queue. Wouldn't you?

Q I'll confess, I avoid a lot of complex games because my life is just too busy for the serious time commitment.

Molyneux: The compromise is that gaming will soon be very invasive into your life. I'm absolutely sure that in the future, you'll be able to port your game to your mobile phone or mobile multi-functional thing, and you'll be able to carry on playing. The best example of that—you can see what an atrocious, irresponsible citizen I am—is that I've been playing Advance Wars II on the GameBoy Advance while driving. I'm death on the road and swerving all over the place when I just want to make that extra button press. My life expectancy is probably measured in minutes now.

Readers can see www.cpumag.com /cpudec03/molyneux for extra interview content.



William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside of Portland, Ore.

Don't Get Burned Buying Memory Upgrades!

Three Questions Other Memory Providers Hope You'll Never Ask...

Were you awarded Computer Shopper's "Best Place to Buy RAM" two years in a row?

50,000 readers in 51 computer-related categories voted Crucial ***Computer Shopper's*** "Best Place to Buy RAM" two years in a row!

SHOPPERS' COMPUTER SHOPPER 2002 CHOICE

"As the official factory outlet for Micron Technology's RAM-manufacturing facilities, (Crucial) offers near-wholesale pricing for a broad array of top-quality memory modules...you have to wonder why anyone would buy memory anywhere else."

— Computer Shopper magazine

Do you actually make the memory you sell?

WARNING! Listen carefully to the answer when you ask this question. Other memory companies claim to manufacture memory, too. What they actually do is assemble the memory chips made by someone else into memory modules. Ask them this: Do you make the chips that go on your memory modules? The chips are the important part, after all.

Crucial is the only memory upgrade supplier that's part of a major DRAM manufacturer, Micron. We actually make the chips that go on the modules.

In fact, because the world's leading computer manufacturers use our memory, chances are good that the memory in your system right now came from Micron. Crucial brings this same high-quality memory directly to you. It only costs less because you don't pay middleman mark-up fees.

Do you offer easy access to over 110,000 guaranteed-compatible upgrades for more than 20,000 systems?

Finding the right memory for your specific system can be confusing—and risky. With so many different systems and so many different types of memory, you can't just buy a "128MB memory module" and be assured that it will work in your system.

Using Crucial's award-winning Memory Selector™, finding the right memory is as easy as 1, 2, 3. In just three easy clicks, you'll find your upgrade—and it's 100% guaranteed to be compatible with your specific system or we'll give you your money back. With more than 110,000 upgrades for over 20,000 computers, notebooks, servers, and electronic devices, we've got what you need.

crucial TECHNOLOGY A Division of Micron www.crucial.com

Over 110,000 upgrades...

- ✓ For over 20,000 desktops, notebooks, servers, workstations, and motherboards—older systems, too!
- ✓ For over 190 brands including Dell, Compaq, HP, Apple, Gateway, ASUS, Intel, and more.
- ✓ In all popular flavors—DDR, SDRAM, EDO, FPM, and more.
- ✓ 100% compatibility guarantee
- ✓ Free technical support
- ✓ Limited lifetime warranty

Factory-direct quality and savings!

128MB SDRAM . . .	As low as	$25.99
256MB SDRAM . . .	As low as	$46.99
512MB SDRAM . . .	As low as	$89.99
128MB DDR.	As low as	$27.99
256MB DDR.	As low as	$47.99
512MB DDR.	As low as	$85.99

FREE SHIPPING*

crucial®
TECHNOLOGY
A Division of Micron

The answers to all your memory questions are just a click away!

http://**promo.crucial.com** keycode: **3smc**

or call toll-free 1-888-363-5162 to talk to a memory advisor.

*See Web site for details.

Prices may vary according to specific system requirements. The price listed was valid on 10/2/03 when we sent this ad to the publisher; however, prices may have dramatically increased or decreased since then. Visit the FAQ section of Crucial.com to learn more about why memory prices go up and down.

© 2003 Micron Technology, Inc. All rights reserved. Crucial, Crucial Technology, the Crucial Technology logo, and The Memory Experts are trademarks/service marks of Micron Technology, Inc. in the U.S. and outside of the U.S. All other trademarks are the property of their respective owners. Crucial Technology is not responsible for omissions or errors in typography or photography.

AMD
64
Athlon FX

Introducing the AMD Athlon™ 64 FX processor. Take your system to extremes. Double the data path from 32- to 64-bit and you more than double the thrill factor. Uninterrupted, ear-splitting, streaming audio and rich, razor sharp video make your pad a launching pad. What's more, you get all the power you need to edit, mix, and model your own digital creations with memory to spare. Prepare to blow minds. Get a dose of the AMD Athlon 64 FX edge at www.amd.com/amdathlon64fx

© 2003 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, AMD Athlon, and combinations thereof are trademarks of Advanced Micro Devices, Inc.